CNS Lab 9 VPN Tunneling Lab

PES1UG20CS084

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Task 1: Network Setup

`ping server-router`

```
PES1UG20CS084@10.9.0.5(Host-U):/# ping server-router
PING server-router (10.9.0.11) 56(84) bytes of data.
64 bytes from server-router.net-10.9.0.0 (10.9.0.11): icmp_seq=1 ttl=64 time=0.738 ms
64 bytes from server-router.net-10.9.0.0 (10.9.0.11): icmp_seq=2 ttl=64 time=0.054 ms
^C
--- server-router ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1003ms
rtt min/avg/max/mdev = 0.054/0.396/0.738/0.342 ms
PES1UG20CS084@10.9.0.5(Host-U):/#
```

`ping 192.168.60.5`

```
PES1UG20CS084@server-router:/# ping 192.168.60.5
PING 192.168.60.5 (192.168.60.5) 56(84) bytes of data.
64 bytes from 192.168.60.5: icmp_seq=1 ttl=64 time=0.961 ms
64 bytes from 192.168.60.5: icmp_seq=2 ttl=64 time=0.133 ms
^C
--- 192.168.60.5 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1003ms
rtt min/avg/max/mdev = 0.133/0.547/0.961/0.414 ms
PES1UG20CS084@server-router:/#
```

`ping 192.168.60.5`

```
PES1UG20CS084@10.9.0.5(Host-U):/# ping 192.168.60.5
PING 192.168.60.5 (192.168.60.5) 56(84) bytes of data.
^C
--- 192.168.60.5 ping statistics ---
11 packets transmitted, 0 received, 100% packet loss, time 10316ms

PES1UG20CS084@10.9.0.5(Host-U):/#
```

`ping server-router`

```
PES1UG20CS084@10.9.0.5(Host-U):/# ping server-router
PING server-router (10.9.0.11) 56(84) bytes of data.
64 bytes from server-router.net-10.9.0.0 (10.9.0.11): icmp_seq=1 ttl=64 time=0.081 ms
64 bytes from server-router.net-10.9.0.0 (10.9.0.11): icmp_seq=2 ttl=64 time=0.360 ms
64 bytes from server-router.net-10.9.0.0 (10.9.0.11): icmp_seq=3 ttl=64 time=0.456 ms
64 bytes from server-router.net-10.9.0.0 (10.9.0.11): icmp_seq=4 ttl=64 time=0.685 ms
^C
--- server-router ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3070ms
rtt min/avg/max/mdev = 0.081/0.395/0.685/0.216 ms
PES1UG20CS084@10.9.0.5(Host-U):/#
```

Corresponding tcpdump

```
PES1UG20CS084@server-router:/# tcpdump -i eth0 -n
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 262144 bytes
16:19:28.638648 IP 10.9.0.5 > 10.9.0.11: ICMP echo request, id 21, seq 1, length 64
16:19:28.638671 IP 10.9.0.11 > 10.9.0.5: ICMP echo reply, id 21, seq 1, length 64
16:19:29.657718 IP 10.9.0.5 > 10.9.0.11: ICMP echo request, id 21, seq 2, length 64
16:19:29.657978 IP 10.9.0.11 > 10.9.0.5: ICMP echo reply, id 21, seq 2, length 64
16:19:30.676581 IP 10.9.0.5 > 10.9.0.11: ICMP echo request, id 21, seq 3, length 64
16:19:30.676922 IP 10.9.0.11 > 10.9.0.5: ICMP echo reply, id 21, seq 3, length 64
16:19:31.708677 IP 10.9.0.5 > 10.9.0.11: ICMP echo request, id 21, seq 4, length 64
16:19:31.709235 IP 10.9.0.11 > 10.9.0.5: ICMP echo reply, id 21, seq 4, length 64
16:19:33.654375 ARP, Request who-has 10.9.0.5 tell 10.9.0.11, length 28
16:19:33.654484 ARP, Request who-has 10.9.0.11 tell 10.9.0.5, length 28
16:19:33.654488 ARP, Reply 10.9.0.11 is-at 02:42:0a:09:00:0b, length 28
16:19:33.654490 ARP, Reply 10.9.0.5 is-at 02:42:0a:09:00:05, length 28
```

Task 2: Create and Configure TUN Interface

Task 2.a: Name of the Interface

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# chmod a+x tun.py
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ./tun.py &
[1] 27
PES1UG20CS084@10.9.0.5(Host-U):/volumes# Interface Name: tun0
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
2: tun0: <POINTOPOINT,MULTICAST,NOARP> mtu 1500 qdisc noop state DOWN group default qlen 500
    link/none
30: eth0@if31: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default
    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
PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

Kill tunnel process:

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# jobs
[1]+  Running                 ./tun.py &
PES1UG20CS084@10.9.0.5(Host-U):/volumes# kill %1
PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

Changing iface name

```python
#!/usr/bin/env python3

import fcntl
import struct
import os
import time
from scapy.all import *

TUNSETIFF = 0x400454ca
IFF_TUN   = 0x0001
IFF_TAP   = 0x0002
IFF_NO_PI = 0x1000

# Create the tun interface
tun = os.open("/dev/net/tun", os.O_RDWR)
ifr = struct.pack('16sH', b'CS084%d', IFF_TUN | IFF_NO_PI)
ifname_bytes  = fcntl.ioctl(tun, TUNSETIFF, ifr)
```

Running `tun.py`

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# chmod a+x tun.py
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ./tun.py &
[1] 37
PES1UG20CS084@10.9.0.5(Host-U):/volumes# Interface Name: CS0840
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
3: CS0840: <POINTOPOINT,MULTICAST,NOARP> mtu 1500 qdisc noop state DOWN group default qlen 500
    link/none
30: eth0@if31: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default
    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
PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

Iface name is `CS0840`

Task 2.b: Set up the TUN Interface

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ip addr add 192.168.53.99/24 dev CS0840
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ip link set dev CS0840 up
PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

Task 2.c: Read from the TUN Interface

```
#while True:
#   time.sleep(10)
while True:
# Get a packet from the tun interface
    packet = os.read(tun, 2048)
    if packet:
        ip = IP(packet)
        print(ip.summary())
```

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# jobs
[1]   Running                 ./tun.py &
[2]-  Stopped                 nano tun.py
[3]+  Stopped                 nano tun.py
PES1UG20CS084@10.9.0.5(Host-U):/volumes# kill %1
```

Task 2.d: Write to the TUN Interface

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# chmod a+x tun1.py
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ./tun1.py &
[4] 99
PES1UG20CS084@10.9.0.5(Host-U):/volumes# Interface Name: CS0840
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: CS0840: <POINTOPOINT,MULTICAST,NOARP,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UNKNOWN group defa
ult qlen 500
    link/none
    inet 192.168.53.99/24 scope global CS0840
       valid_lft forever preferred_lft forever
30: eth0@if31: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default
    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
PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ping 192.168.53.5
PING 192.168.53.5 (192.168.53.5) 56(84) bytes of data.
CS0840: IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
64 bytes from 192.168.53.5: icmp_seq=1 ttl=99 time=5.92 ms
clsCS0840: IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
64 bytes from 192.168.53.5: icmp_seq=2 ttl=99 time=5.58 ms
CS0840: IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
64 bytes from 192.168.53.5: icmp_seq=3 ttl=99 time=13.7 ms
CS0840: IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
64 bytes from 192.168.53.5: icmp_seq=4 ttl=99 time=9.02 ms
^C
--- 192.168.53.5 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3033ms
rtt min/avg/max/mdev = 5.578/8.547/13.676/3.249 ms
PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

Task 3: Send the IP Packet to VPN Server Through a Tunnel

```
PES1UG20CS084@server-router:/volumes# ./tun_server.py &
[1] 29
PES1UG20CS084@server-router:/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
34: eth0@if35: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default
    link/ether 02:42:0a:09:00:0b brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 10.9.0.11/24 brd 10.9.0.255 scope global eth0
       valid_lft forever preferred_lft forever
36: eth1@if37: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default
    link/ether 02:42:c0:a8:3c:0b brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 192.168.60.11/24 brd 192.168.60.255 scope global eth1
       valid_lft forever preferred_lft forever
PES1UG20CS084@server-router:/volumes#
```

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ./tun_client.py &
[4] 125
PES1UG20CS084@10.9.0.5(Host-U):/volumes# Interface Name: CS0840
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: CS0840: <POINTOPOINT,MULTICAST,NOARP,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UNKNOWN group defa
ult qlen 500
    link/none
    inet 192.168.53.99/24 scope global CS0840
       valid_lft forever preferred_lft forever
30: eth0@if31: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default
    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
PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ping 192.168.53.5
PING 192.168.53.5 (192.168.53.5) 56(84) bytes of data.
IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.53.5 echo-request 0 / Raw
^C
--- 192.168.53.5 ping statistics ---
7 packets transmitted, 0 received, 100% packet loss, time 6151ms

PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

```
PES1UG20CS084@server-router:/volumes# ./tun_server.py
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.53.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.53.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.53.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.53.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.53.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.53.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.53.5
```

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ping 192.168.60.5
PING 192.168.60.5 (192.168.60.5) 56(84) bytes of data.
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
^C
--- 192.168.60.5 ping statistics ---
6 packets transmitted, 0 received, 100% packet loss, time 5130ms

PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

```
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
```

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ip route
default via 10.9.0.1 dev eth0
10.9.0.0/24 dev eth0 proto kernel scope link src 10.9.0.5
192.168.53.0/24 dev CS0840 proto kernel scope link src 192.168.53.99
192.168.60.0/24 dev CS0840 scope link
PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

Task 4: Set Up the VPN Server

```
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ip route
default via 10.9.0.1 dev eth0
10.9.0.0/24 dev eth0 proto kernel scope link src 10.9.0.5
192.168.53.0/24 dev CS0840 proto kernel scope link src 192.168.53.99
192.168.60.0/24 dev CS0840 scope link
PES1UG20CS084@10.9.0.5(Host-U):/volumes# jobs
[2]-  Stopped                 nano tun.py
[3]+  Stopped                 nano tun.py
[4]   Running                 ./tun_client.py &
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ping 192.168.60.5
PING 192.168.60.5 (192.168.60.5) 56(84) bytes of data.
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
IP / ICMP 192.168.53.99 > 192.168.60.5 echo-request 0 / Raw
^C
--- 192.168.60.5 ping statistics ---
6 packets transmitted, 0 received, 100% packet loss, time 5116ms

PES1UG20CS084@10.9.0.5(Host-U):/volumes#
```

```
PES1UG20CS084@server-router:/volumes# nano tun_server1.py
PES1UG20CS084@server-router:/volumes# ^C
PES1UG20CS084@server-router:/volumes# chmod a+x tun_server1.py
PES1UG20CS084@server-router:/volumes# ./tun_server1.py
Interface Name: CS0840
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
10.9.0.5:60258 --> 0.0.0.0:9090
   Inside: 192.168.53.99 --> 192.168.60.5
```

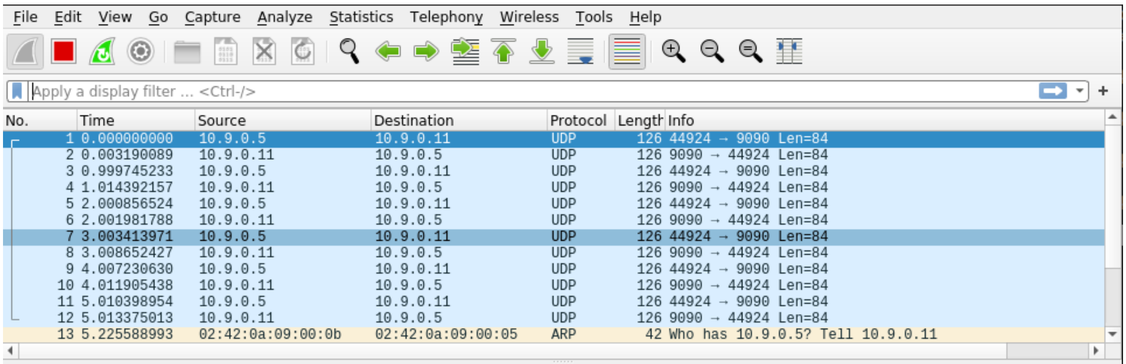
```
PES1UG20CS084@192.168.60.5:/# tcpdump -i eth0 -n
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 262144 bytes
17:32:57.250257 IP 192.168.53.99 > 192.168.60.5: ICMP echo request, id 142, seq 1, length 64
17:32:57.250297 IP 192.168.60.5 > 192.168.53.99: ICMP echo reply, id 142, seq 1, length 64
17:32:58.267262 IP 192.168.53.99 > 192.168.60.5: ICMP echo request, id 142, seq 2, length 64
17:32:58.267280 IP 192.168.60.5 > 192.168.53.99: ICMP echo reply, id 142, seq 2, length 64
17:32:59.293090 IP 192.168.53.99 > 192.168.60.5: ICMP echo request, id 142, seq 3, length 64
17:32:59.293134 IP 192.168.60.5 > 192.168.53.99: ICMP echo reply, id 142, seq 3, length 64
17:33:00.319329 IP 192.168.53.99 > 192.168.60.5: ICMP echo request, id 142, seq 4, length 64
17:33:00.319652 IP 192.168.60.5 > 192.168.53.99: ICMP echo reply, id 142, seq 4, length 64
17:33:01.343040 IP 192.168.53.99 > 192.168.60.5: ICMP echo request, id 142, seq 5, length 64
17:33:01.343387 IP 192.168.60.5 > 192.168.53.99: ICMP echo reply, id 142, seq 5, length 64
17:33:02.359833 IP 192.168.53.99 > 192.168.60.5: ICMP echo request, id 142, seq 6, length 64
17:33:02.359862 IP 192.168.60.5 > 192.168.53.99: ICMP echo reply, id 142, seq 6, length 64
17:33:02.486752 ARP, Request who-has 192.168.60.11 tell 192.168.60.5, length 28
17:33:02.487186 ARP, Request who-has 192.168.60.5 tell 192.168.60.11, length 28
17:33:02.487219 ARP, Reply 192.168.60.5 is-at 02:42:c0:a8:3c:05, length 28
17:33:02.487224 ARP, Reply 192.168.60.11 is-at 02:42:c0:a8:3c:0b, length 28
```

Task 5: Handling Traffic in Both Directions

```
seed@VM: ~/.../Labsetup 101x11
PES1UG20CS084@10.9.0.5(Host-U):/volumes# chmod a+x tun_client_select.py
PES1UG20CS084@10.9.0.5(Host-U):/volumes# ./tun_client_select.py
Interface Name: CS0840
From tun    ==>: 192.168.53.99 --> 192.168.60.5
From socket <==: 192.168.60.5 --> 192.168.53.99
From tun    ==>: 192.168.53.99 --> 192.168.60.5
From socket <==: 192.168.60.5 --> 192.168.53.99
From tun    ==>: 192.168.53.99 --> 192.168.60.5
From socket <==: 192.168.60.5 --> 192.168.53.99
From tun    ==>: 192.168.53.99 --> 192.168.60.5
From socket <==: 192.168.60.5 --> 192.168.53.99
```

```
seed@VM: ~/.../Labsetup 101x11
PES1UG20CS084@10.9.0.5(Host-U):/# ping 192.168.60.5
PING 192.168.60.5 (192.168.60.5) 56(84) bytes of data.
64 bytes from 192.168.60.5: icmp_seq=1 ttl=63 time=12.5 ms
64 bytes from 192.168.60.5: icmp_seq=2 ttl=63 time=18.1 ms
64 bytes from 192.168.60.5: icmp_seq=3 ttl=63 time=3.24 ms
64 bytes from 192.168.60.5: icmp_seq=4 ttl=63 time=9.35 ms
64 bytes from 192.168.60.5: icmp_seq=5 ttl=63 time=13.1 ms
64 bytes from 192.168.60.5: icmp_seq=6 ttl=63 time=9.34 ms
^C
--- 192.168.60.5 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5012ms
```

```
PES1UG20CS084@server-router:/volumes# chmod a+x tun_server_select.py
PES1UG20CS084@server-router:/volumes# ./tun_server_select.py
Interface Name: CS0840
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
```



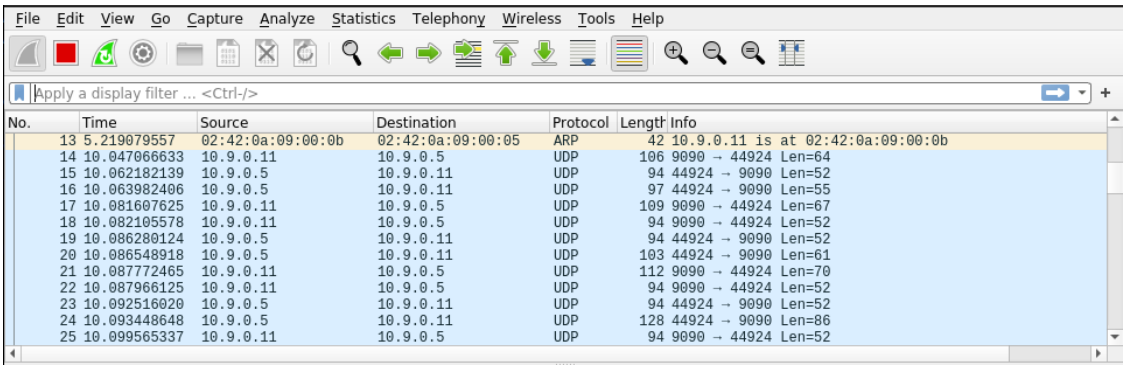
telnet

```
From socket <==: 192.168.60.5 --> 192.168.53.99
From tun    ==>: 192.168.53.99 --> 192.168.60.5
From socket <==: 192.168.60.5 --> 192.168.53.99
From tun    ==>: 192.168.53.99 --> 192.168.60.5
From socket <==: 192.168.60.5 --> 192.168.53.99
From tun    ==>: 192.168.53.99 --> 192.168.60.5
```

```
seed@VM: ~/.../Labsetup 101x11
PES1UG20CS084@10.9.0.5(Host-U):/# telnet 192.168.60.5
Trying 192.168.60.5...
Connected to 192.168.60.5.
Escape character is '^]'.
Ubuntu 20.04.1 LTS
2d8977f5061f login: seed
Password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.4.0-54-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
```

```
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
From tun    ==>: 192.168.60.5 --> 192.168.53.99
From socket <==: 192.168.53.99 --> 192.168.60.5
```



No.	Time	Source	Destination	Protocol	Length	Info
13	5.219079557	02:42:0a:09:00:0b	02:42:0a:09:00:05	ARP	42	10.9.0.11 is at 02:42:0a:09:00:0b
14	10.047066633	10.9.0.11	10.9.0.5	UDP	106	9090 → 44924 Len=64
15	10.062182139	10.9.0.5	10.9.0.11	UDP	94	44924 → 9090 Len=52
16	10.063982406	10.9.0.5	10.9.0.11	UDP	97	44924 → 9090 Len=55
17	10.081607625	10.9.0.11	10.9.0.5	UDP	109	9090 → 44924 Len=67
18	10.082105578	10.9.0.11	10.9.0.5	UDP	94	9090 → 44924 Len=52
19	10.086280124	10.9.0.5	10.9.0.11	UDP	94	44924 → 9090 Len=52
20	10.086548918	10.9.0.5	10.9.0.11	UDP	103	44924 → 9090 Len=61
21	10.087772465	10.9.0.11	10.9.0.5	UDP	112	9090 → 44924 Len=70
22	10.087966125	10.9.0.11	10.9.0.5	UDP	94	9090 → 44924 Len=52
23	10.092516020	10.9.0.5	10.9.0.11	UDP	94	44924 → 9090 Len=52
24	10.093448648	10.9.0.5	10.9.0.11	UDP	128	44924 → 9090 Len=86
25	10.099565337	10.9.0.11	10.9.0.5	UDP	94	9090 → 44924 Len=52

Task 6: Tunnel-Breaking Experiment

21	43.444874892	10.9.0.5	10.9.0.11	UDP	94	44924 → 9090 Len=52
22	47.741010761	02:42:0a:09:00:05	02:42:0a:09:00:0b	ARP	42	Who has 10.9.0.11? Tell 10.9.0.5
23	47.741140884	02:42:0a:09:00:0b	02:42:0a:09:00:05	ARP	42	10.9.0.11 is at 02:42:0a:09:00:0b
24	75.673165584	10.9.0.5	10.9.0.11	UDP	95	44924 → 9090 Len=53
25	75.673211614	10.9.0.11	10.9.0.5	ICMP	123	Destination unreachable (Port unreachable)
26	75.883860165	10.9.0.5	10.9.0.11	UDP	95	44924 → 9090 Len=53
27	75.883942990	10.9.0.11	10.9.0.5	ICMP	123	Destination unreachable (Port unreachable)
28	76.111235058	10.9.0.5	10.9.0.11	UDP	95	44924 → 9090 Len=53
29	76.111386080	10.9.0.11	10.9.0.5	ICMP	123	Destination unreachable (Port unreachable)
30	76.576199846	10.9.0.5	10.9.0.11	UDP	95	44924 → 9090 Len=53

after reconnecting to vpn

No.	Time	Source	Destination	Protocol	Length	Info
45	104.319100353	10.9.0.11	10.9.0.5	ICMP	123	Destination unreachable (Port unreachable)
46	109.439041346	02:42:0a:09:00:05	02:42:0a:09:00:0b	ARP	42	Who has 10.9.0.11? Tell 10.9.0.5
47	109.439488353	02:42:0a:09:00:0b	02:42:0a:09:00:05	ARP	42	10.9.0.11 is at 02:42:0a:09:00:0b
48	133.501660916	10.9.0.5	10.9.0.11	UDP	95	44924 → 9090 Len=53
49	133.504946838	10.9.0.11	10.9.0.5	UDP	97	9090 → 44924 Len=55
50	133.512281188	10.9.0.5	10.9.0.11	UDP	112	44924 → 9090 Len=70
51	133.515173798	10.9.0.11	10.9.0.5	UDP	95	9090 → 44924 Len=53
52	133.516195536	10.9.0.11	10.9.0.5	UDP	95	9090 → 44924 Len=53
53	133.516597294	10.9.0.11	10.9.0.5	UDP	96	9090 → 44924 Len=54
54	133.516963267	10.9.0.11	10.9.0.5	UDP	96	9090 → 44924 Len=54
55	133.517312652	10.9.0.11	10.9.0.5	UDP	115	9090 → 44924 Len=73
56	133.517441515	10.9.0.5	10.9.0.11	UDP	94	44924 → 9090 Len=52
57	133.518394022	10.9.0.5	10.9.0.11	UDP	94	44924 → 9090 Len=52