

Name: Michael Kwame Appiah
Index No: 3024620

Exercise 2 Observations

STEP 6

- **PC1:** On this device, the pc2 returned its MAC address while the ping from pc1 to pc2 was sent.

```
root@pc1: /
--- Startup Commands Log
++ ip link set dev eth0 address 00:00:00:00:a1
++ ip address add 192.168.0.21/24 dev eth0
++ ip route add default via 192.168.0.1
--- End Startup Commands Log
root@pc1:/# arp -a
? (192.168.0.22) at 00:00:00:00:a2 [ether] on eth0
root@pc1:/#
```

- **PC2:** On this device, no observations were made while the ping from pc1 to pc2 was sent.

```
root@pc2: /
--- Startup Commands Log
++ ip link set dev eth0 address 00:00:00:00:a2
++ ip address add 192.168.0.22/24 dev eth0
++ ip route add default via 192.168.0.1
--- End Startup Commands Log
root@pc2:/# ping 192.168.0.21
PING 192.168.0.21 (192.168.0.21) 56(84) bytes of data:
64 bytes from 192.168.0.21: icmp_seq=1 ttl=64 time=1.39 ms
64 bytes from 192.168.0.21: icmp_seq=2 ttl=64 time=1.02 ms
64 bytes from 192.168.0.21: icmp_seq=3 ttl=64 time=0.619 ms
64 bytes from 192.168.0.21: icmp_seq=4 ttl=64 time=1.00 ms
64 bytes from 192.168.0.21: icmp_seq=5 ttl=64 time=0.556 ms
64 bytes from 192.168.0.21: icmp_seq=6 ttl=64 time=0.930 ms
64 bytes from 192.168.0.21: icmp_seq=7 ttl=64 time=0.943 ms
64 bytes from 192.168.0.21: icmp_seq=8 ttl=64 time=0.599 ms
64 bytes from 192.168.0.21: icmp_seq=9 ttl=64 time=0.755 ms
64 bytes from 192.168.0.21: icmp_seq=10 ttl=64 time=1.31 ms
64 bytes from 192.168.0.21: icmp_seq=11 ttl=64 time=0.300 ms
64 bytes from 192.168.0.21: icmp_seq=12 ttl=64 time=0.740 ms
^C
--- 192.168.0.21 ping statistics ---
12 packets transmitted, 12 received, 0% packet loss, time 11133ms
rtt min/avg/max/mdev = 0.556/0.972/1.896/0.538 ms
root@pc2:/# arp -a
? (192.168.0.21) at 00:00:00:00:a1 [ether] on eth0
root@pc2:/#
```

- **EVE:** On this device, no observations were made while the ping from pc1 to pc2 was sent.

```
root@eve: /
--- Startup Commands Log
++ ip link set dev eth0 address 00:00:00:00:00:ae
++ ip address add 192.168.0.33/24 dev eth0
++ ip route add default via 192.168.0.1
--- End Startup Commands Log
root@eve:/# arp -a
root@eve:/#
```

- **PC3:** On this device, no observations were made while the ping from pc1 to pc2 was sent.

```
root@pc3: /
root@pc3:/# arp -a
root@pc3:/# arp -a
root@pc3:/#
```

- **PC4:** On this device, no observations were made while the ping from pc1 to pc2 was sent.

```
root@pc4: /
--- Startup Commands Log
++ ip link set dev eth0 address 00:00:00:00:00:b4
++ ip address add 192.168.1.24/24 dev eth0
++ ip route add default via 192.168.1.1
--- End Startup Commands Log
root@pc4:/# arp -a
root@pc4:/#
```

- **R1:** On this device, no observations were made while the ping from pc1 to pc2 was sent.

```
root@r1: /
--- Startup Commands Log
* ip link set dev eth0 address 00:00:00:00:00:00:af
* ip link set dev eth1 address 00:00:00:00:00:00:bf
* ip address add 192.168.0.1/24 dev eth0
* ip address add 192.168.1.1/24 dev eth1
* ip route add 192.168.1.0/24 via 192.168.0.1 dev eth0
INETLINK answers: File exists
* ip route add 192.168.0.0/24 via 192.168.1.1 dev eth1
INETLINK answers: File exists
--- End Startup Commands Log
root@r1: /# arp -a
root@r1: /#
```

STEP 7

- **PC1:** On this device, the **arp -a** command returns the mac address of the router which serves as the gateway of the ping.

```
root@pc1: /
64 bytes from 192.168.0.22: icmp_seq=2 ttl=64 time=1.02 ms
64 bytes from 192.168.0.22: icmp_seq=3 ttl=64 time=8.45 ms
64 bytes from 192.168.0.22: icmp_seq=4 ttl=64 time=0.731 ms
64 bytes from 192.168.0.22: icmp_seq=5 ttl=64 time=3.79 ms
64 bytes from 192.168.0.22: icmp_seq=6 ttl=64 time=0.964 ms
64 bytes from 192.168.0.22: icmp_seq=7 ttl=64 time=1.11 ms
64 bytes from 192.168.0.22: icmp_seq=8 ttl=64 time=0.845 ms
64 bytes from 192.168.0.22: icmp_seq=9 ttl=64 time=0.940 ms
64 bytes from 192.168.0.22: icmp_seq=10 ttl=64 time=0.771 ms
64 bytes from 192.168.0.22: icmp_seq=11 ttl=64 time=0.602 ms
64 bytes from 192.168.0.22: icmp_seq=12 ttl=64 time=0.667 ms
64 bytes from 192.168.0.22: icmp_seq=13 ttl=64 time=0.512 ms
64 bytes from 192.168.0.22: icmp_seq=14 ttl=64 time=0.764 ms
64 bytes from 192.168.0.22: icmp_seq=15 ttl=64 time=0.913 ms
^C
--- 192.168.0.22 ping statistics ---
15 packets transmitted, 15 received, 0% packet loss, time 14189ms
rtt min/avg/max/mdev = 0.512/1.910/8.453/2.365 ms
root@pc1: /# arp -a
? (192.168.0.22) at 00:00:00:00:00:a2 [ether] on eth0
root@pc1: /# arp -a
? (192.168.0.22) at 00:00:00:00:00:a2 [ether] on eth0
? (192.168.0.1) at 00:00:00:00:00:af [ether] on eth0
root@pc1: /#
```

- **PC2:** No new observations were made on this device while the ping from pc4 to pc1 was sent.

```
root@pc2: /
--- Startup Commands Log
++ ip link set dev eth0 address 00:00:00:00:a2
++ ip address add 192.168.0.22/24 dev eth0
++ ip route add default via 192.168.0.1
--- End Startup Commands Log
root@pc2:/# arp -a
? (192.168.0.21) at 00:00:00:00:a1 [ether] on eth0
root@pc2:/# arp -a
? (192.168.0.21) at 00:00:00:00:a1 [ether] on eth0
root@pc2:/#
```

- **EVE:** On this device, no observations were made while the ping from pc4 to pc1 was sent.

```
root@eve: /
--- Startup Commands Log
++ ip link set dev eth0 address 00:00:00:00:ae
++ ip address add 192.168.0.33/24 dev eth0
++ ip route add default via 192.168.0.1
--- End Startup Commands Log
root@eve:/# arp -a
root@eve:/# arp -a
root@eve:/#
```

- **PC3:** On this device, no observations were made while the ping from pc4 to pc1 was sent.

```
root@pc3: /
root@pc3:/# arp -a
root@pc3:/# arp -a
root@pc3:/#
```

- **PC4:** The **arp -a** command returns the MAC address of r1 which serves as the gateway of the ping.

```
root@pc4: /
++ ip route add default via 192.168.1.1
--- End Startup Commands Log
root@pc4:/# arp -a
root@pc4:/# ping 192.168.0.21
PING 192.168.0.21 (192.168.0.21) 56(84) bytes of data.
64 bytes from 192.168.0.21: icmp_seq=1 ttl=63 time=35.2 ms
64 bytes from 192.168.0.21: icmp_seq=2 ttl=63 time=2.30 ms
64 bytes from 192.168.0.21: icmp_seq=3 ttl=63 time=1.55 ms
64 bytes from 192.168.0.21: icmp_seq=4 ttl=63 time=2.49 ms
64 bytes from 192.168.0.21: icmp_seq=5 ttl=63 time=2.35 ms
64 bytes from 192.168.0.21: icmp_seq=6 ttl=63 time=1.32 ms
64 bytes from 192.168.0.21: icmp_seq=7 ttl=63 time=0.610 ms
64 bytes from 192.168.0.21: icmp_seq=8 ttl=63 time=1.86 ms
64 bytes from 192.168.0.21: icmp_seq=9 ttl=63 time=2.52 ms
64 bytes from 192.168.0.21: icmp_seq=10 ttl=63 time=1.43 ms
64 bytes from 192.168.0.21: icmp_seq=11 ttl=63 time=1.28 ms
64 bytes from 192.168.0.21: icmp_seq=12 ttl=63 time=1.48 ms
^C
--- 192.168.0.21 ping statistics ---
12 packets transmitted, 12 received, 0% packet loss, time 11043ms
rtt min/avg/max/mdev = 0.610/4.529/35.163/9.253 ms
root@pc4:/# arp -a
? (192.168.1.1) at 00:00:00:00:00:bf [ether] on eth0
root@pc4:/#
```

- **R1:** The **arp -a** command returns the MAC addresses on both sides of the network.

```
root@r1: /
--- Startup Commands Log
++ ip link set dev eth0 address 00:00:00:00:af
++ ip link set dev eth1 address 00:00:00:00:bf
++ ip address add 192.168.0.1/24 dev eth0
++ ip address add 192.168.1.1/24 dev eth1
++ ip route add 192.168.1.0/24 via 192.168.0.1 dev eth0
RTNETLINK answers: File exists
++ ip route add 192.168.0.0/24 via 192.168.1.1 dev eth1
RTNETLINK answers: File exists
--- End Startup Commands Log
root@r1:/# arp -a
root@r1:/# arp -a
? (192.168.0.21) at 00:00:00:00:00:a1 [ether] on eth0
? (192.168.1.24) at 00:00:00:00:00:b4 [ether] on eth1
root@r1:/#
```

STEP 12

- **PC1:** On this device, the **arp -a** command returns MAC addresses of pc2 and eve

```
root@pc1: /
root@pc1:/# ping 192.168.0.33
PING 192.168.0.33 (192.168.0.33) 56(84) bytes of data:
64 bytes from 192.168.0.33: icmp_seq=1 ttl=64 time=2.86 ms
64 bytes from 192.168.0.33: icmp_seq=2 ttl=64 time=0.849 ms
64 bytes from 192.168.0.33: icmp_seq=3 ttl=64 time=0.976 ms
64 bytes from 192.168.0.33: icmp_seq=4 ttl=64 time=0.840 ms
64 bytes from 192.168.0.33: icmp_seq=5 ttl=64 time=0.548 ms
64 bytes from 192.168.0.33: icmp_seq=6 ttl=64 time=1.53 ms
64 bytes from 192.168.0.33: icmp_seq=7 ttl=64 time=0.675 ms
64 bytes from 192.168.0.33: icmp_seq=8 ttl=64 time=0.664 ms
64 bytes from 192.168.0.33: icmp_seq=9 ttl=64 time=0.903 ms
64 bytes from 192.168.0.33: icmp_seq=10 ttl=64 time=0.877 ms
64 bytes from 192.168.0.33: icmp_seq=11 ttl=64 time=0.915 ms
64 bytes from 192.168.0.33: icmp_seq=12 ttl=64 time=0.913 ms
64 bytes from 192.168.0.33: icmp_seq=13 ttl=64 time=1.34 ms
64 bytes from 192.168.0.33: icmp_seq=14 ttl=64 time=2.04 ms
^C
--- 192.168.0.33 ping statistics ---
14 packets transmitted, 14 received, 0% packet loss, time 13254ms
rtt min/avg/max/mdev = 0.548/1.137/2.859/0.607 ms
root@pc1:/# arp -a
? (192.168.0.33) at 00:00:00:00:00:ae [ether] on eth0
? (192.168.0.22) at 00:00:00:00:00:a2 [ether] on eth0
root@pc1:/#
```

- **PC2:** The **arp -a** command returns the MAC addresses of pc1 and eve to this device.

```
root@pc2: /
--- Startup Commands Log
++ ip link set dev eth0 address 00:00:00:00:a2
++ ip address add 192.168.0.22/24 dev eth0
++ ip route add default via 192.168.0.1
--- End Startup Commands Log
root@pc2:/# arp -a
? (192.168.0.21) at 00:00:00:00:a1 [ether] on eth0
? (192.168.0.33) at 00:00:00:00:ae [ether] on eth0
root@pc2:/#
```

- **EVE:** The **arp -a** command returns the MAC addresses of pc1 and pc2 to this device.

```
root@eve: /
PING 192.168.0.22 (192.168.0.22): 56 data bytes
64 bytes from 192.168.0.22: icmp_seq=0 ttl=64 time=2.151 ms
64 bytes from 192.168.0.22: icmp_seq=1 ttl=64 time=1.761 ms
64 bytes from 192.168.0.22: icmp_seq=2 ttl=64 time=2.817 ms
64 bytes from 192.168.0.22: icmp_seq=3 ttl=64 time=19.995 ms
64 bytes from 192.168.0.22: icmp_seq=4 ttl=64 time=2.263 ms
64 bytes from 192.168.0.22: icmp_seq=5 ttl=64 time=1.128 ms
64 bytes from 192.168.0.22: icmp_seq=6 ttl=64 time=1.114 ms
64 bytes from 192.168.0.22: icmp_seq=7 ttl=64 time=1.535 ms
64 bytes from 192.168.0.22: icmp_seq=8 ttl=64 time=1.426 ms
64 bytes from 192.168.0.22: icmp_seq=9 ttl=64 time=1.488 ms
64 bytes from 192.168.0.22: icmp_seq=10 ttl=64 time=0.751 ms
64 bytes from 192.168.0.22: icmp_seq=11 ttl=64 time=0.359 ms
64 bytes from 192.168.0.22: icmp_seq=12 ttl=64 time=0.734 ms
64 bytes from 192.168.0.22: icmp_seq=13 ttl=64 time=0.634 ms
64 bytes from 192.168.0.22: icmp_seq=14 ttl=64 time=1.326 ms
64 bytes from 192.168.0.22: icmp_seq=15 ttl=64 time=0.430 ms
^C--- 192.168.0.22 ping statistics ---
16 packets transmitted, 16 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.359/2.502/19.995/4.565 ms
root@eve:/# arp -a
? (192.168.0.22) at 00:00:00:00:a2 [ether] on eth0
? (192.168.0.21) at 00:00:00:00:a1 [ether] on eth0
root@eve:/#
```

STEP 13

After spoofing, it was observed that after the ping signal was sent to eve before its intended destination.

```
root@pc2:~# ping 192.168.0.21
PING 192.168.0.21 (192.168.0.21) 56(84) bytes of data:
64 bytes from 192.168.0.21: icmp_seq=1 ttl=64 time=3.03 ms
From 192.168.0.33 icmp_seq=2 Redirect Host(New nexthop: 192.168.0.21)
64 bytes from 192.168.0.21: icmp_seq=2 ttl=64 time=1.18 ms
From 192.168.0.33 icmp_seq=3 Redirect Host(New nexthop: 192.168.0.21)
64 bytes from 192.168.0.21: icmp_seq=3 ttl=64 time=1.88 ms
From 192.168.0.33 icmp_seq=4 Redirect Host(New nexthop: 192.168.0.21)
64 bytes from 192.168.0.21: icmp_seq=4 ttl=64 time=1.03 ms
From 192.168.0.33 icmp_seq=5 Redirect Host(New nexthop: 192.168.0.21)
64 bytes from 192.168.0.21: icmp_seq=5 ttl=64 time=1.47 ms
From 192.168.0.33 icmp_seq=6 Redirect Host(New nexthop: 192.168.0.21)
64 bytes from 192.168.0.21: icmp_seq=6 ttl=64 time=1.26 ms
64 bytes from 192.168.0.21: icmp_seq=7 ttl=64 time=0.351 ms
64 bytes from 192.168.0.21: icmp_seq=8 ttl=64 time=0.234 ms
64 bytes from 192.168.0.21: icmp_seq=9 ttl=64 time=0.846 ms
64 bytes from 192.168.0.21: icmp_seq=10 ttl=64 time=0.187 ms
64 bytes from 192.168.0.21: icmp_seq=11 ttl=64 time=0.296 ms
64 bytes from 192.168.0.21: icmp_seq=12 ttl=64 time=0.281 ms
64 bytes from 192.168.0.21: icmp_seq=13 ttl=64 time=0.695 ms
64 bytes from 192.168.0.21: icmp_seq=14 ttl=64 time=0.514 ms
64 bytes from 192.168.0.21: icmp_seq=15 ttl=64 time=0.263 ms
64 bytes from 192.168.0.21: icmp_seq=16 ttl=64 time=0.297 ms
64 bytes from 192.168.0.21: icmp_seq=17 ttl=64 time=0.797 ms
64 bytes from 192.168.0.21: icmp_seq=18 ttl=64 time=0.566 ms
64 bytes from 192.168.0.21: icmp_seq=19 ttl=64 time=0.665 ms
^C
--- 192.168.0.21 ping statistics ---
19 packets transmitted, 19 received, +5 errors, 0% packet loss, time 18836ms
rtt min/avg/max/mdev = 0.187/0.833/3.028/0.691 ms
root@pc2:~#
```