Arctos Morei  
  
## Unit 11 Submission File: Network Security Homework

### Part 1: Review Questions

#### Security Control Types

The concept of defense in depth can be broken down into three different security control types. Identify the security control type of each set of defense tactics.

1. Walls, bollards, fences, guard dogs, cameras, and lighting are what type of security control?

Answer: Physical Sec

2. Security awareness programs, BYOD policies, and ethical hiring practices are what type of security control?

Answer: Admin/Management Sec

3. Encryption, biometric fingerprint readers, firewalls, endpoint security, and intrusion detection systems are what type of security control?

Answer: Tech/Operational Sec

#### Intrusion Detection and Attack indicators

1. What's the difference between an IDS and an IPS?

Answer: Intrustion Dection System detects intrustions after the fact. Intrusion Prevention Systems are ways to stop intrusions so they can't happen in the first place.

2. What's the difference between an Indicator of Attack and an Indicator of Compromise?

Answer: IOA shows when the network is being attacked, whereas IOC shows that an attacker is in the network already.

#### The Cyber Kill Chain

Name each of the seven stages for the Cyber Kill chain and provide a brief example of each.

1. Stage 1:Recon

Researching and gathering data about the target.

2. Stage 2:Weaponization

Using the data gathered to backdoor into the system and deliver a payload.

3. Stage 3:Delivery

Deliver weaponized bundles such as listeners to the victim via websites, USB, phishing, etc.

4. Stage 4:Exploitation

Exploit the system using vulnerabilities in order to execute code on the victim's system, such as using an exploit in older versions of Icecast.

5. Stage 5:Installation

Install the desired malware into the victim's system after breaching.

6. Stage 6:Command & Control

Remotely control the devices and data to manipulate it.

7. Stage 7:Actions on Objectives

Proceed to accomplish the original goal set when planning the attack.

#### Snort Rule Analysis

Use the Snort rule to answer the following questions:

Snort Rule #1

```bash

alert tcp $EXTERNAL\_NET any -> $HOME\_NET 5800:5820 (msg:"ET SCAN Potential VNC Scan 5800-5820"; flags:S,12; threshold: type both, track by\_src, count 5, seconds 60; reference:url,doc.emergingthreats.net/2002910; classtype:attempted-recon; sid:2002910; rev:5; metadata:created\_at 2010\_07\_30, updated\_at 2010\_07\_30;)

```

1. Break down the Sort Rule header and explain what is happening.

Answer: Creates an alert on TCP traffic when any port on External\_Net attempts to go to Home\_Net on any port between 5800 - 5820 5 times within a minute. References an emergingthreats doc for the type of threat and classifies it as a reconnaissance attempt.

2. What stage of the Cyber Kill Chain does this alert violate?

Answer: Reconnaissance - 1

3. What kind of attack is indicated?

Answer: Could be a Vulnerable Network Computing Scan

Snort Rule #2

```bash

alert tcp $EXTERNAL\_NET $HTTP\_PORTS -> $HOME\_NET any (msg:"ET POLICY PE EXE or DLL Windows file download HTTP"; flow:established,to\_client; flowbits:isnotset,ET.http.binary; flowbits:isnotset,ET.INFO.WindowsUpdate; file\_data; content:"MZ"; within:2; byte\_jump:4,58,relative,little; content:"PE|00 00|"; distance:-64; within:4; flowbits:set,ET.http.binary; metadata: former\_category POLICY; reference:url,doc.emergingthreats.net/bin/view/Main/2018959; classtype:policy-violation; sid:2018959; rev:4; metadata:created\_at 2014\_08\_19, updated\_at 2017\_02\_01;)

```

1. Break down the Sort Rule header and explain what is happening.

Answer: Creates an alert on TCP traffic when any HTTP ports on External\_Net attempt to go to any Home\_Net ports. Will return "ET POLICY PE EXE or DLL Windows file download HTTP". Searches for MZ content. References an emergingthreats.net document for more details. This is classified as a policy violation.

2. What layer of the Defense in Depth model does this alert violate?

Answer: EDR

3. What kind of attack is indicated?

Answer: Could be malicious software being downloaded

Snort Rule #3

- Your turn! Write a Snort rule that alerts when traffic is detected inbound on port 4444 to the local network on any port. Be sure to include the `msg` in the Rule Option.

Answer: alert tcp $EXTERNAL\_NET 4444 -> $HOME\_NET any (msg:"Inbound Traffic detected at port 4444"

### Part 2: "Drop Zone" La

#### Log into the Azure `firewalld` machine

Log in using the following credentials:

- Username: `sysadmin`

- Password: `cybersecurity`

#### Uninstall `ufw`

Before getting started, you should verify that you do not have any instances of `ufw` running. This will avoid conflicts with your `firewalld` service. This also ensures that `firewalld` will be your default firewall.

- Run the command that removes any running instance of `ufw`.

```bash

$ sudo ufw disable

$ sudo apt remove ufw

```

#### Enable and start `firewalld`

By default, these service should be running. If not, then run the following commands:

- Run the commands that enable and start `firewalld` upon boots and reboots.

```bash

$ sudo systemctl enable firewalld

$ sudo systemctl start firewalld

```

Note: This will ensure that `firewalld` remains active after each reboot.

#### Confirm that the service is running.

- Run the command that checks whether or not the `firewalld` service is up and running.

```bash

$ sudo systemctl status firewalld

```

#### List all firewall rules currently configured.

Next, lists all currently configured firewall rules. This will give you a good idea of what's currently configured and save you time in the long run by not doing double work.

- Run the command that lists all currently configured firewall rules:

```bash

$ sudo firewall-cmd –list-all

```  
Text

Description automatically generated  
- Take note of what Zones and settings are configured. You many need to remove unneeded services and settings.

#### List all supported service types that can be enabled.

- Run the command that lists all currently supported services to see if the service you need is available

```bash

$ sudo firewall-cmd –get-services

```  
Text

Description automatically generated

- We can see that the `Home` and `Drop` Zones are created by default.

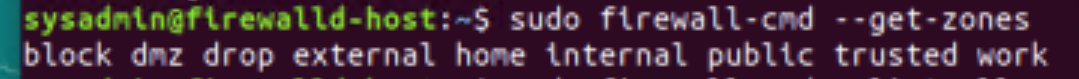
#### Zone Views

- Run the command that lists all currently configured zones.

```bash

$ sudo firewall-cmd –get-zones

```



- We can see that the `Public` and `Drop` Zones are created by default. Therefore, we will need to create Zones for `Web`, `Sales`, and `Mail`.

#### Create Zones for `Web`, `Sales` and `Mail`.

- Run the commands that creates Web, Sales and Mail zones.

```bash

$ sudo firewall-cmd –permanent –new-zone=web

$ sudo firewall-cmd –permanent –new-zone=sales

$ sudo firewall-cmd –permanent –new-zone=mail

```

#### Set the zones to their designated interfaces:

- Run the commands that sets your `eth` interfaces to your zones.

```bash

$ sudo firewall-cmd --reload

$ sudo firewall-cmd –zone=web –add-interface=eth1

$ sudo firewall-cmd –zone=sales –add-interface=eth2

$ sudo firewall-cmd –zone=mail –add-interface=eth3

```

#### Add services to the active zones:

- Run the commands that add services to the \*\*public\*\* zone, the \*\*web\*\* zone, the \*\*sales\*\* zone, and the \*\*mail\*\* zone.

- Public:

```bash

Text

Description automatically generated ```

- Web:

```bash

$ sudo firewall-cmd –zone=web –add-service=http

```

- Sales

```bash

$ sudo firewall-cmd –zone=sales –add-service=https

```

- Mail

```bash

Text

Description automatically generated ```

- What is the status of `http`, `https`, `smtp` and `pop3`?

#### Add your adversaries to the Drop Zone.

- Run the command that will add all current and any future blacklisted IPs to the Drop Zone.

```bash

$

$

$

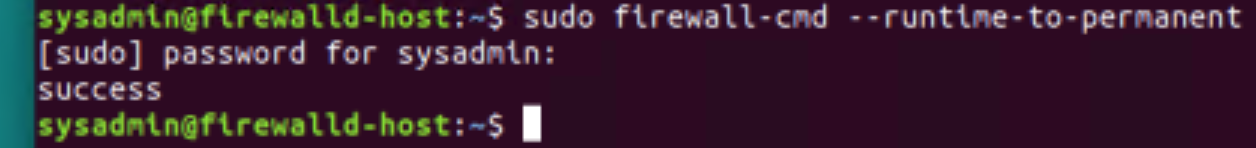
```

#### Make rules permanent then reload them:

It's good practice to ensure that your `firewalld` installation remains nailed up and retains its services across reboots. This ensure that the network remains secured after unplanned outages such as power failures.

- Run the command that reloads the `firewalld` configurations and writes it to memory

```bash

 ```

#### View active Zones

Now, we'll want to provide truncated listings of all currently \*\*active\*\* zones. This a good time to verify your zone settings.

- Run the command that displays all zone services.

```bash

$ sudo firewall-cmd –get-active-zones ```

Chart, text

Description automatically generated

#### Block an IP address

- Use a rich-rule that blocks the IP address `138.138.0.3`.

```bash

$ sudo firewall-cmd –add-rich-rule=’rule family=”ipv4” source address=”138.138.0.3” reject’

```

(this one took me a couple attempts)  
Text

Description automatically generated

#### Block Ping/ICMP Requests

Harden your network against `ping` scans by blocking `icmp ehco` replies.

- Run the command that blocks `pings` and `icmp` requests in your `public` zone.

```bash

$ sudo firewall-cmd –permanent –add-ecmp-block=echo-request –add-icmp-block=echo-reply

```

#### Rule Check

Now that you've set up your brand new `firewalld` installation, it's time to verify that all of the settings have taken effect.

- Run the command that lists all of the rule settings. Do one command at a time for each zone.

```bash

$ sudo firewall-cmd –info-zone=drop

$ sudo firewall-cmd –info-zone=mail

$ sudo firewall-cmd –info-zone=public

$ sudo firewall-cmd –info-zone=sales

$ sudo firewall-cmd –info-zone=web

```

- Are all of our rules in place? If not, then go back and make the necessary modifications before checking again.

Congratulations! You have successfully configured and deployed a fully comprehensive `firewalld` installation.

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### Part 3: IDS, IPS, DiD and Firewalls

Now, we will work on another lab. Before you start, complete the following review questions.

#### IDS vs. IPS Systems

1. Name and define two ways an IDS connects to a network.

Answer 1: Switch Port Analyzer

Answer 2: Test Access Port

2. Describe how an IPS connects to a network.

Answer: An IPS is placed directly between the source and destination, and from there actively analyzes and protects all traffic flow entering the network.

3. What type of IDS compares patterns of traffic to predefined signatures and is unable to detect Zero-Day attacks?

Answer: Signature based IDS

4. Which type of IDS is beneficial for detecting all suspicious traffic that deviates from the well-known baseline and is excellent at detecting when an attacker probes or sweeps a network?

Answer: Anomaly based IDS

#### Defense in Depth

1. For each of the following scenarios, provide the layer of Defense in Depth that applies:

1. A criminal hacker tailgates an employee through an exterior door into a secured facility, explaining that they forgot their badge at home.

Answer: Physical

2. A zero-day goes undetected by antivirus software.

Answer: Technical - Software

3. A criminal successfully gains access to HR’s database.

Answer: Technical - Network

4. A criminal hacker exploits a vulnerability within an operating system.

Answer: Technical - Software

5. A hacktivist organization successfully performs a DDoS attack, taking down a government website.

Answer: Technical - Network

6. Data is classified at the wrong classification level.

Answer: Administrative – Policy/Procedure

7. A state sponsored hacker group successfully firewalked an organization to produce a list of active services on an email server.

Answer: Administrative - Policy

2. Name one method of protecting data-at-rest from being readable on hard drive.

Answer: Encrypt the hard drive.

3. Name one method to protect data-in-transit.

Answer: Encryption via HTTPS/SSL/TLS/etc.

4. What technology could provide law enforcement with the ability to track and recover a stolen laptop.

Answer: Geo location tracking

5. How could you prevent an attacker from booting a stolen laptop using an external hard drive?

Answer: Encryption via Device Encryption or BitLocker/FileVault

#### Firewall Architectures and Methodologies

1. Which type of firewall verifies the three-way TCP handshake? TCP handshake checks are designed to ensure that session packets are from legitimate sources.

Answer: Stateful Inspection Firewall

2. Which type of firewall considers the connection as a whole? Meaning, instead of looking at only individual packets, these firewalls look at whole streams of packets at one time.

Answer: Stateful Inspection Firewall

3. Which type of firewall intercepts all traffic prior to being forwarded to its final destination. In a sense, these firewalls act on behalf of the recipient by ensuring the traffic is safe prior to forwarding it?

Answer: Proxy Firewall

4. Which type of firewall examines data within a packet as it progresses through a network interface by examining source and destination IP address, port number, and packet type- all without opening the packet to inspect its contents?

Answer: Packet Filtering Firewall

5. Which type of firewall filters based solely on source and destination MAC address?

Answer: MAC Firewall