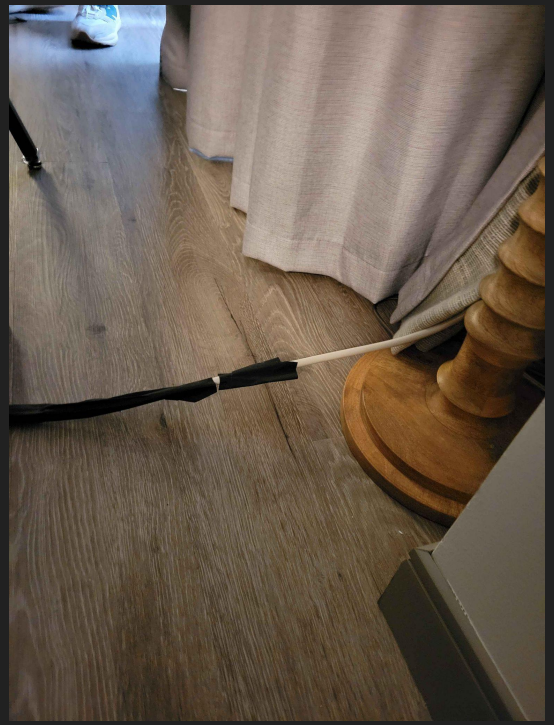
You like Networking?

Yes. You will love it.

Bad layer 1 network security ——————>



Sign in :3

https://jessh.zip/ccdcweek3

Homework

https://jessh.zip/ccdchw3

whoami

Evan Deters

~~3rd Year CIS~~

~~ISSE~~

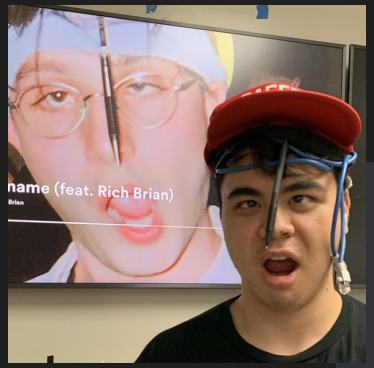
~~**CCDC**~~

~~Captain~~	~~2023-Present~~
~~Networking~~	~~2022-2023~~
~~Windows~~	~~2021-2022~~

~~**CPTC**~~

~~Moral Supporter~~	~~2021-Present~~

Systems Engineer @ Boeing



whoami

Dylan Michalak

4th year CS

CCDC

- Captain 2024-2025
- Secondary Windows 2023-2024

SWIFT

- Co-Director Competitions 2024-2025
- SWIntern 2023-2024

Competitive Mango Enjoyer

Valorant Hardstuck Silver/Gold :(

Agenda

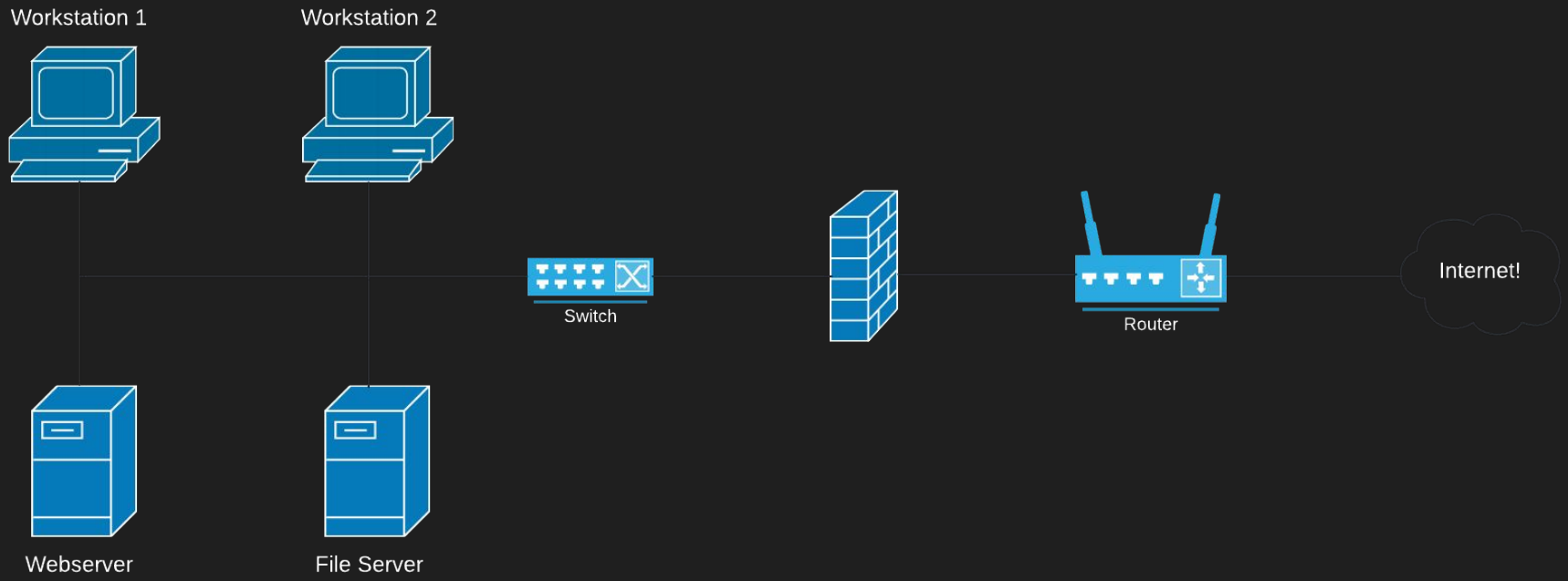
1. Intro to Networking
2. Competition Networking
3. Client Server Model
4. Firewalls!
5. OSI Model
6. Lab

1

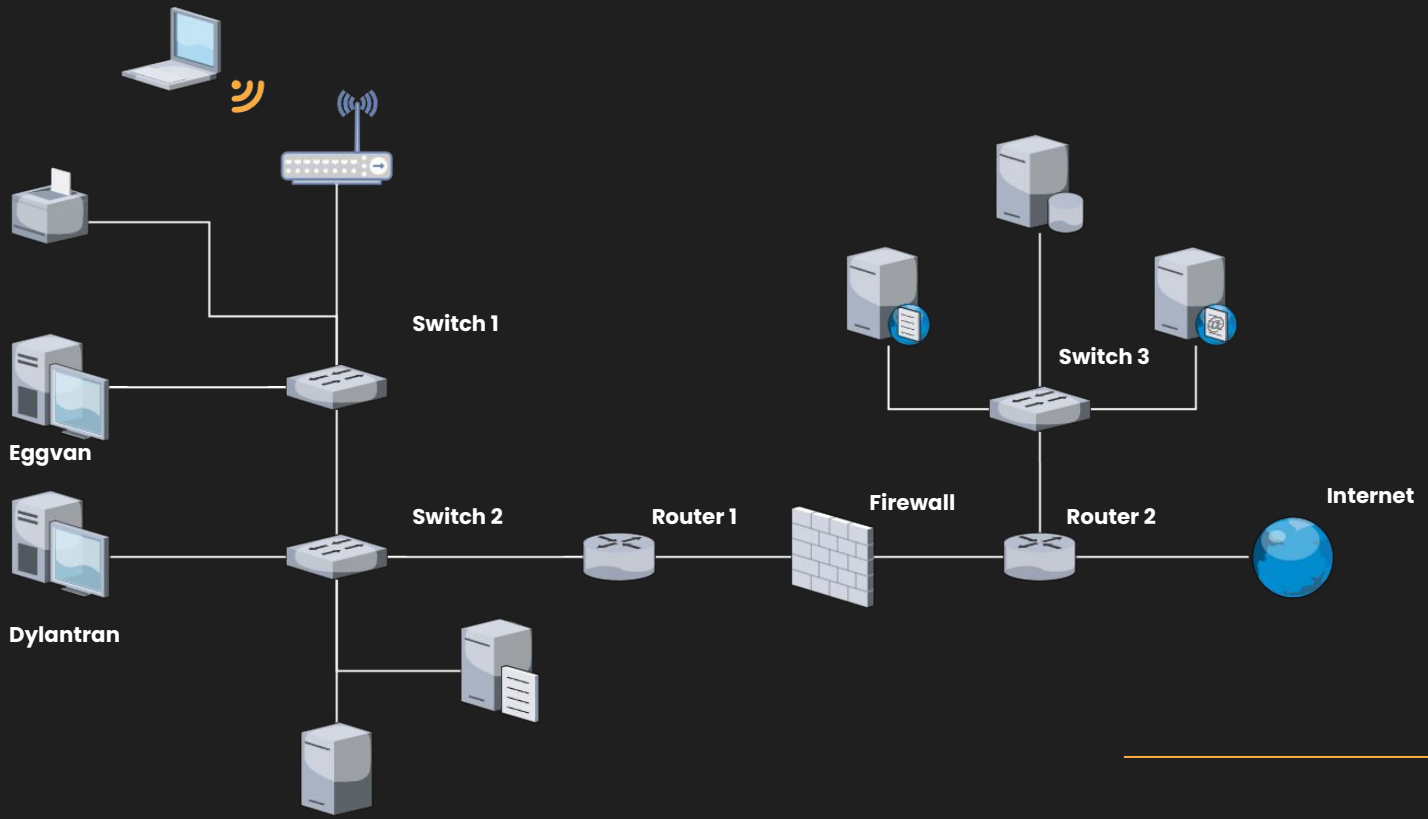
Intro to Networking

Alright then, let's do some networking

Basic Topology



Basic Topology?



Network Devices

Anything on the network

- Computers, phones, routers, switches, etc.
- Contains at least one **Network Interface Card,** or **NIC**
  - Wired
  - Wireless

Lingo

- IP Address
- Subnet Mask
- Router
- Default Gateway
- Service
- Protocol
- Port
- Interface
- Firewall

???

Subnet Masks

IPv4 address → 192.168.1.100

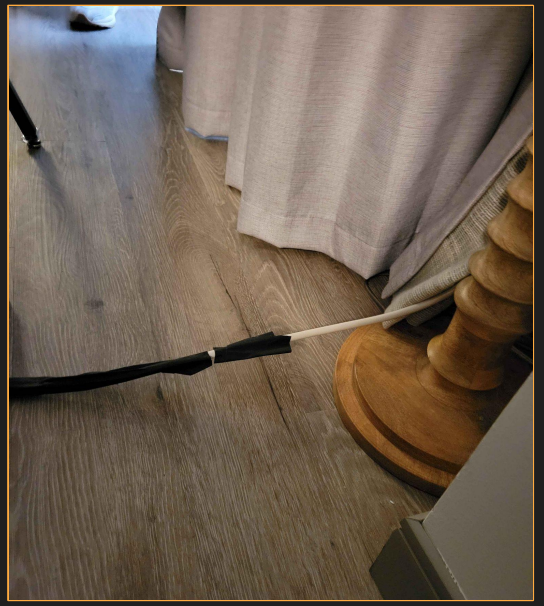
255.255.255.0 → **Subnet Mask**

```
IPv4 Address. . . . . . . . . . . : 192.168.1.115
Subnet Mask . . . . . . . . . . . : 255.255.255.0
Default Gateway . . . . . . . . . : 192.168.1.1
```

2

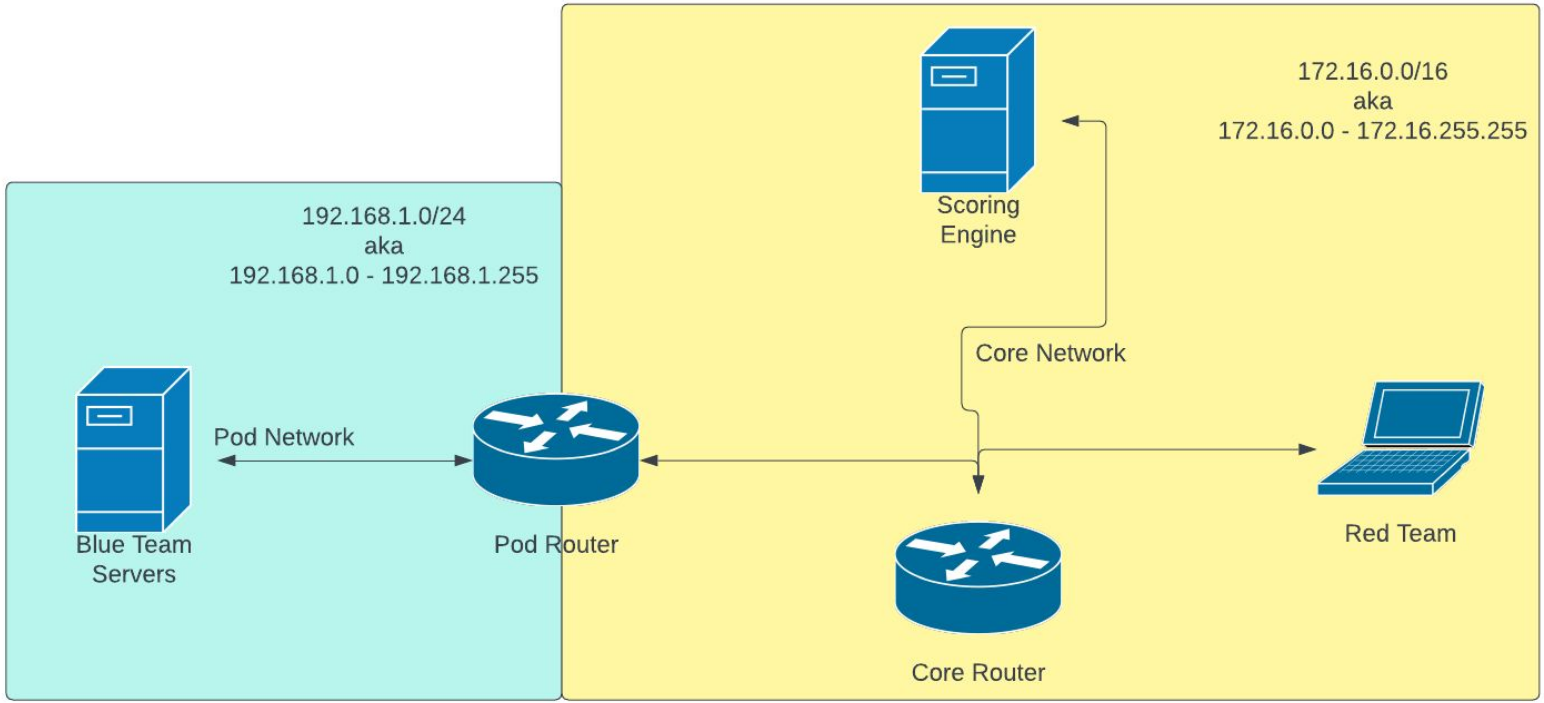
Competition Networking

Networking Makes the Services go Round



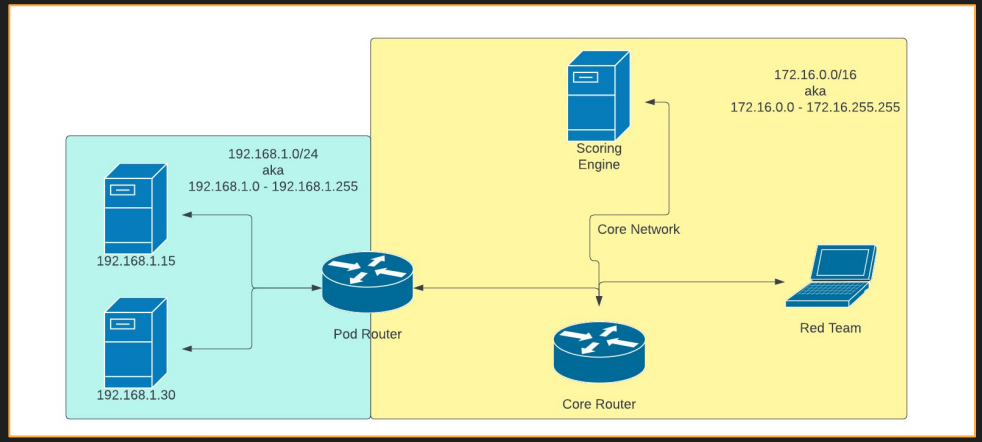
Don't trip :D

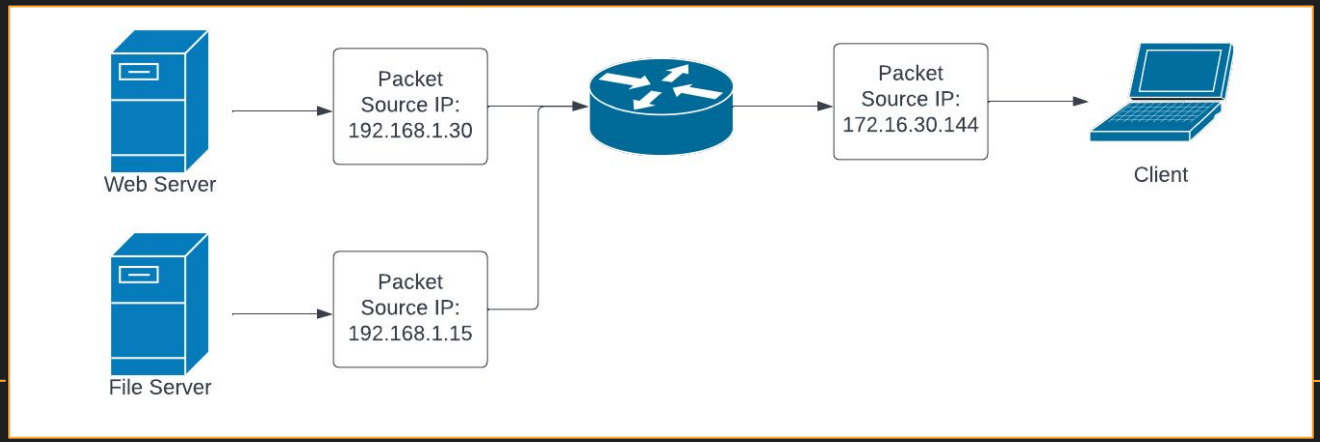
Competition Topology



NAT

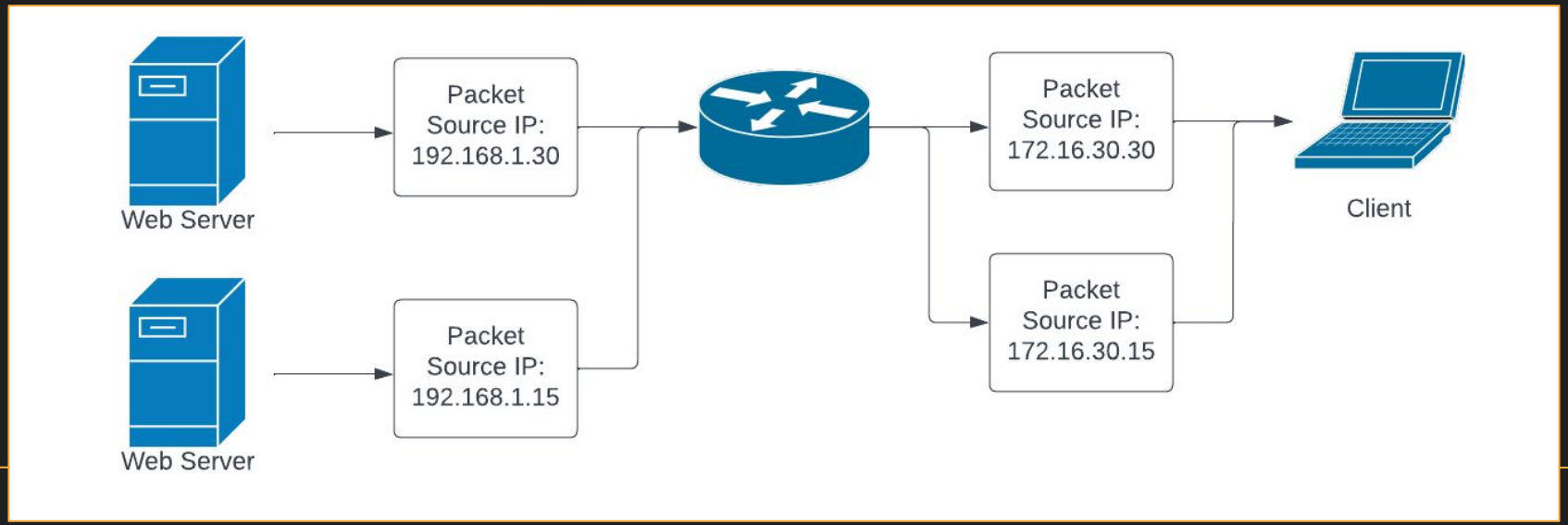
- Network Address Translation
- Built to conserve IP addresses
  - One-to-Many Translation





1:1 NAT

- Direct Translations
- 192.168.1.0/24 → 172.16.30.0/24



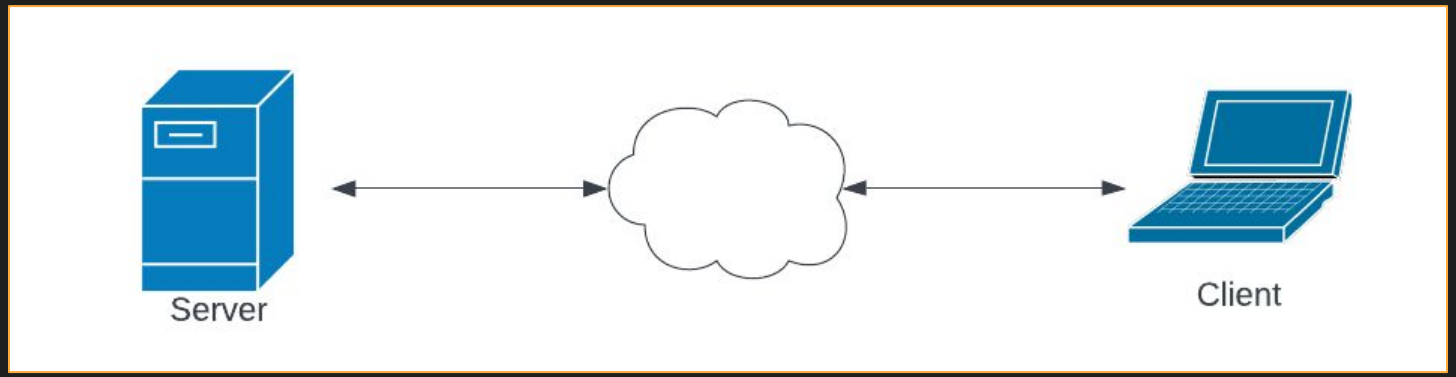
Error 416

3

Client-Server Model

A Restaurant, but for Packets

Client–Server Model



What are ports?

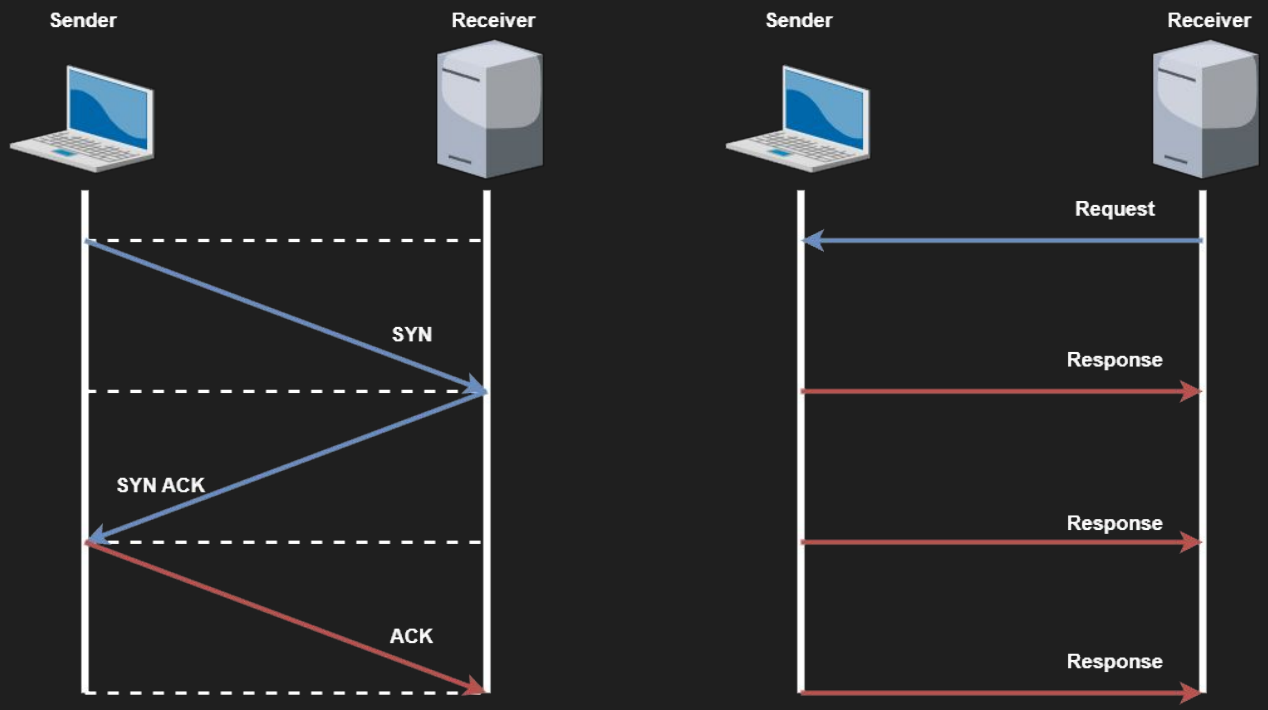
Numbers that identify, along with an IP address, which network socket to connect to on a given device.

- Common port numbers and associated services
  - TCP 20 and 21 - FTP
  - TCP 22 - SSH
  - TCP 25 - SMTP
  - UDP 53 - DNS
  - TCP 80 - HTTP
  - TCP 443 - HTTPS
  - etc.

TCP and UDP

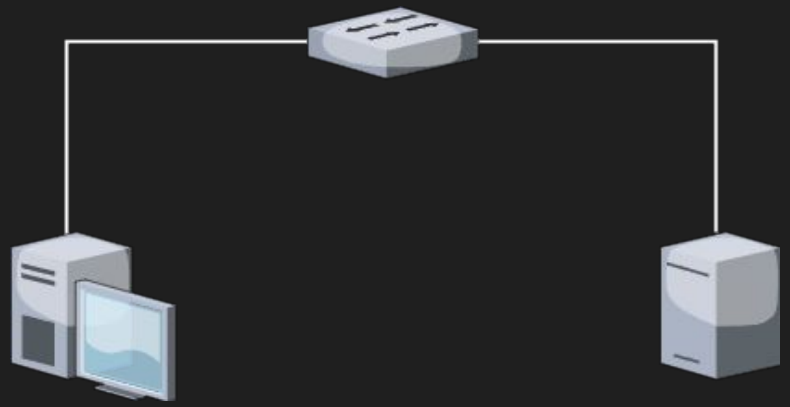
- TCP - Slow but reliable
  - Synchronization
  - Flow control
  - TCP Handshake
- UDP - Fast but unreliable
  - No error-checking
  - No acknowledgements
  - Just send data

TCP and UDP


Sender
Receiver
SYN
SYN ACK
ACK
Sender
Receiver
Request
Response
Response
Response

What are sockets?

Each end of a connection, basically a pairing between an IP and a port.



IP: 192.168.1.10
MAC: AA:AA:AA:AA:AA:AA

IP: 192.168.1.58
MAC: EE:EE:EE:EE:EE:EE

192.168.1.10:57138 → **192.168.1.58:80**

why

Identify normal/abnormal traffic

- Is it coming from scoring engine/orange team? Or is it red team?

Troubleshooting services

- Firewall issue? Service disabled?

```
C:\Windows\System32>netstat -ano

Active Connections

  Proto  Local Address          Foreign Address        State           PID
  TCP    0.0.0.0:135            0.0.0.0:0              LISTENING       1372
  TCP    0.0.0.0:445            0.0.0.0:0              LISTENING       4
  TCP    0.0.0.0:902            0.0.0.0:0              LISTENING       4868
  TCP    0.0.0.0:912            0.0.0.0:0              LISTENING       4868
```

Ports & Services Review

- TCP and UDP
- Ports - numbers that identify a running service/application
- Common ports
- Source and destination addresses/ports
  - **Ephemeral ports** on client-side
  - Sockets

4

Firewalls

FIREWALL TIME BABEYY

Block IPs

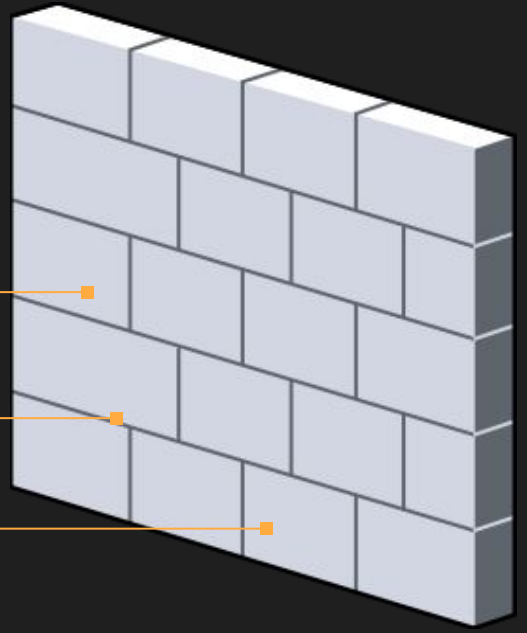
Can block a whole subnet or individual.

Block Ports

Block which ports the external network can access on the LAN

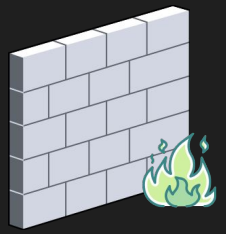
Filtering

Ingress and Egress filtering rules.



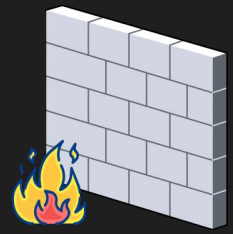
Host Firewall vs Network Firewall

NGFW vs Traditional

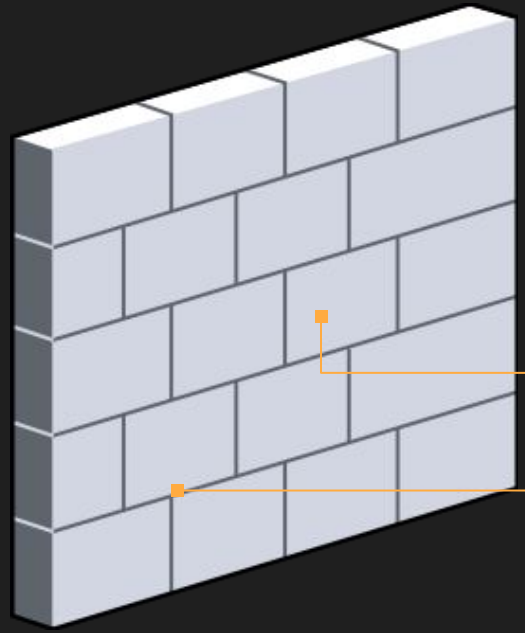


- Stateful Inspection on incoming and outgoing traffic
- Comprehensive application control and visibility
- Easy to install, configure, integrate security tools, reducing administrative controls
- SSL traffic can be decrypted and inspected.
- IPS & IDS are integrated

- Stateful Inspection on incoming and outgoing traffic
- Partial application control and visibility only
- Managing security tools separately is $$$
- Cannot decrypt and inspect SSL traffic
- Integrated IPS and IDS are deployed separately in traditional firewalls



Stateless vs Stateful



Stateless

ACL. Looks at
Individual packets.

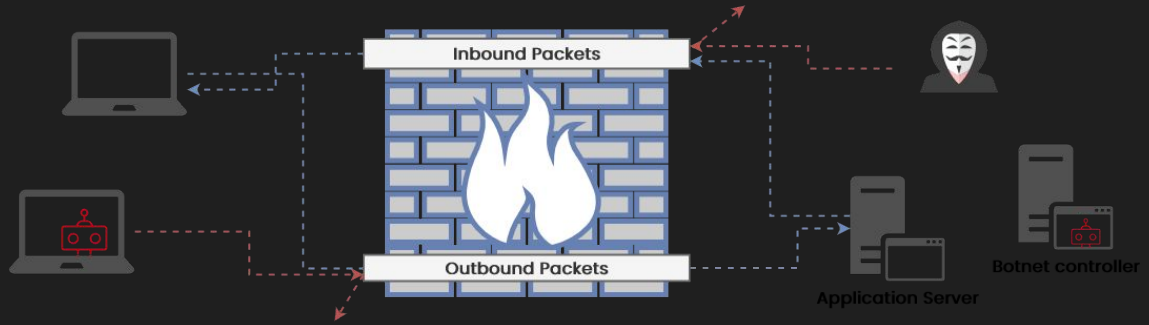
Stateful

Traffic patterns and flows.
Remembers connections.

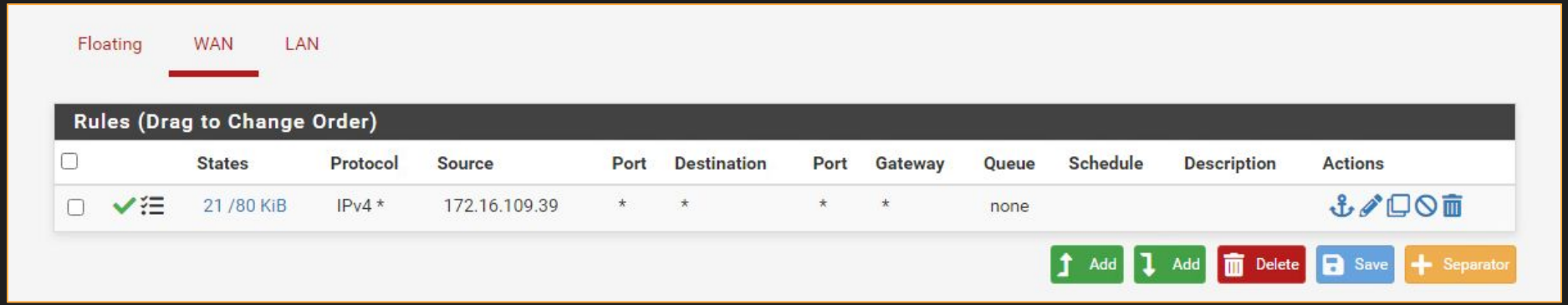
FW Example

Inbound
- Only allow required services
- Allow certain subnets
- Allow certain ip addresses

Outbound
- Block everything going outbound (break internet)



WAN Firewall



LAN Firewall

Floating WAN LAN

Rules (Drag to Change Order)

	States	Protocol	Source	Port	Destination	Port	Gateway	Queue	Schedule	Description	Actions
	✓	0 /3.83 MiB	*	*	*	LAN Address	443 80	*	*		Anti-Lockout Rule	
☐	✗	0 /0 B	IPv4 *	*	*	*	*	*	none			
☐	✓	3 /2.07 GiB	IPv4 *	LAN net	*	*	*	*	none		Default allow LAN to any rule	
☐	✓	0 /0 B	IPv6 *	LAN net	*	*	*	*	none		Default allow LAN IPv6 to any rule	

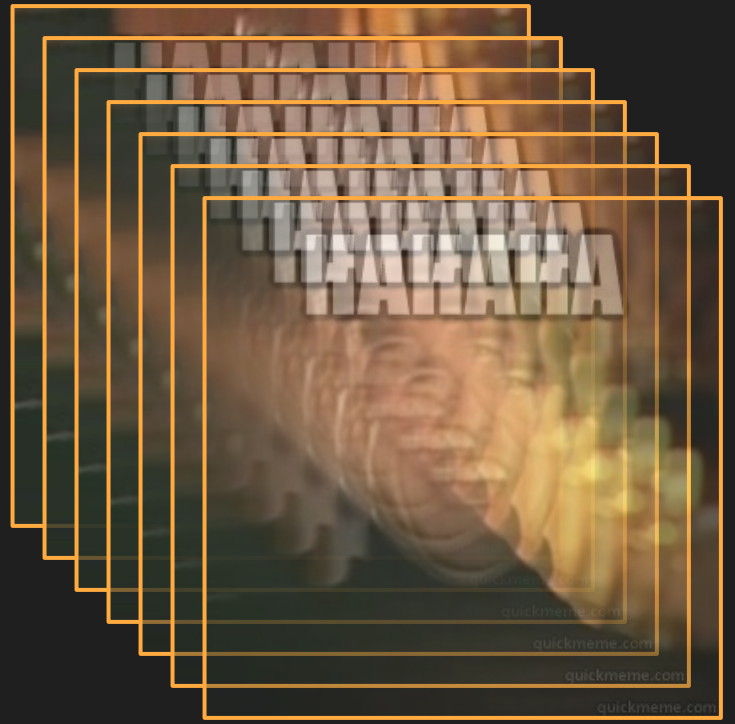
Add Add Delete Save Separator

Firewall Demo

5

OSI Model

no



Thanks!

Any questions? Questions are very cool. Please ask questions I am very lonely :((

6

LAB TIME