Comp 8006 Assignment 2

Network Emulator

By: Peyman
& John Warren

For: Aman Abdulla

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Design Work

Objective

To design, implement and test a standalone Linux firewall and packet filter

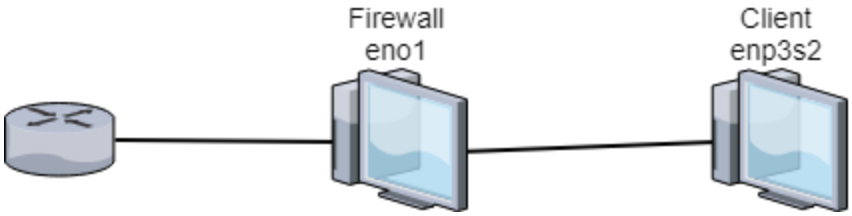
Usage

Firewall
Run with root access ./fw0.sh
Client
Run with root access ./client_setup.sh

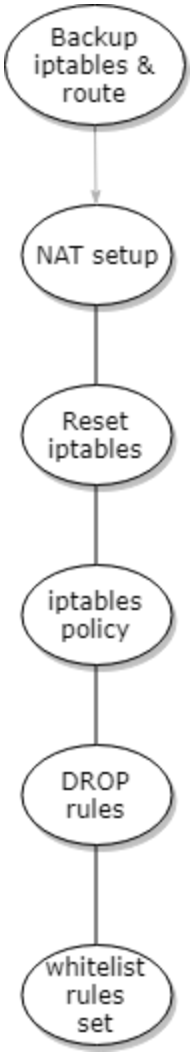
Specifications

1 - use netfilter
2 - load user configuration for all forwarded traffic
3 - set default policies for firewall
4 - dns, dhcp enabled
5 - in/out tcp/udp ports, icmp types
6 - default rule = drop
7 - reject wrong way (i.e. syn in on high ports)
8 - accept fragments
9 - drop tcp with SYN & FIN set
10 - no telnet packets allowed
11 - block external
111, 137-139, 515, 32768-32775
12 - ftp/ssh minimum delay,
13 - ftp max thruput
14 - first [en01] = outside, second [enp3s2] = inside
15 - test procedure; test rules, print results (log)
16 - need to know which rule passed/failed
17 - Allow user to define own rules
18 – separate file for config
19 – define network interfaces
20 – define allowed tcp, udp, icmp
21 – stateful filtering

Set up



State Machine



Pseudo Code

User Variables

1 – Provide variables to allow user to define values for internal and external interfaces, subnets and IP addresses.

2 – Allow user to define what ports to allow for udp and tcp and icmp types

Configure Firewall

1- Backup existing configuration
2- configure network cards
3- Flush existing configuration
4- apply default rule and drop all packets
5- define chains
6- apply user rules, assigning chains for each of tcp, udp, icmp
    a. for each port, apply rule, add to chain

Configure client

1- Backup current config
2- Disable primary network
3- Connect network cable
4- Configure internal network card

Test Plan & Results

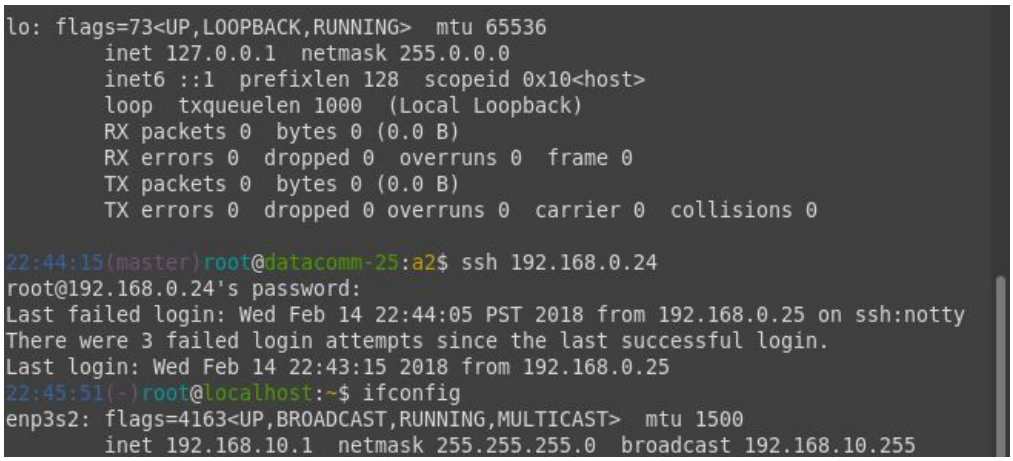
Usage ‘./test.sh <IP of target>’ on either client for outbound or another machine on the network for inbound

Inbound

Testing	Test method	expected	Result
TCP port 22	hping3 ip -V -S -p 22 -c 1	ALLOWED	PASS
TCP port 80	hping3 ip -V -S -p 80 -c 1	ALLOWED	PASS
TCP port 443	hping3 ip -V -S -p 443 -c 1	ALLOWED	PASS
UDP port 53	hping3 ip -V –udp -S -p 53 -c 1	ALLOWED	FAILED
UDP port 67	hping3 ip -V –udp -S -p 67 -c 1	ALLOWED	FAILED
UDP port 68	hping3 ip -V –udp -S -p 68 -c 1	ALLOWED	FAILED
ICMP port 0	hping3 ip -V -1 -S -p 0 -c 1	ALLOWED	FAILED
ICMP port 8	hping3 ip -V -1 -S -p 8 -c 1	ALLOWED	FAILED
TCP port 23	hping3 ip -V -S -p 23 -c 1	DROPPED	PASS
TCP port 111	hping3 ip -V -S -p 111 -c 1	DROPPED	PASS
TCP port 137	hping3 ip -V -S -p 137 -c 1	DROPPED	PASS
TCP port 138	hping3 ip -V -S -p 138 -c 1	DROPPED	PASS
TCP port 139	hping3 ip -V -S -p 139 -c 1	DROPPED	PASS
TCP port 515	hping3 ip -V -S -p 515 -c 1	DROPPED	PASS
TCP port 32768	hping3 ip -V -S -p 32768 -c 1	DROPPED	PASS
TCP port 32775	hping3 ip -V -S -p 32775 -c 1	DROPPED	PASS
UDP port 23	hping3 ip -V –udp -1 -S -p 0 -c 1	DROPPED	PASS
UDP port 111	hping3 ip -V –udp -1 -S -p 8 -c 1	DROPPED	PASS

UDP port 137	hping3 ip -V –udp -S -p 23 -c 1	DROPPED	PASS
UDP port 138	hping3 ip -V –udp -S -p 111 -c 1	DROPPED	PASS
UDP port 139	hping3 ip -V –udp -S -p 137 -c 1	DROPPED	PASS
UDP port 515	hping3 ip -V –udp -S -p 138 -c 1	DROPPED	PASS
UDP port 32768	hping3 ip -V –udp -S -p 139 -c 1	DROPPED	PASS
UDP port 32775	hping3 ip -V –udp -S -p 515 -c 1	DROPPED	PASS
ICMP port 200	hping3 ip -V -1 -S -p 200 -c 1	DROPPED	PASS
TCP SPOOF	hping3 ip -V -c 1 -S -s 80 -p 80 --spoof 192.168.10.5	DROPPED	PASS
TCP SYN FIN	hping3 ip -V -c 1 -s 1000 -p 80 -SF	DROPPED	PASS
UDP fragment	hping3 ip -V -S -p 22 -c 1 -f	DROPPED	

SSH in - Connected



Outbound

Testing	Test method	expected	Result
TCP port 22	hping3 ip -V -S -p 22 -c 1	ALLOWED	PASS
TCP port 80	hping3 ip -V -S -p 80 -c 1	ALLOWED	PASS
TCP port 443	hping3 ip -V -S -p 443 -c 1	ALLOWED	PASS
UDP port 53	hping3 ip -V –udp -S -p 53 -c 1	ALLOWED	PASS
UDP port 67	hping3 ip -V –udp -S -p 67 -c 1	ALLOWED	PASS
UDP port 68	hping3 ip -V –udp -S -p 68 -c 1	ALLOWED	PASS
ICMP port 0	hping3 ip -V -1 -S -p 0 -c 1	ALLOWED	PASS
ICMP port 8	hping3 ip -V -1 -S -p 8 -c 1	ALLOWED	PASS
TCP port 23	hping3 ip -V -S -p 23 -c 1	DROPED	PASS
TCP port 111	hping3 ip -V -S -p 111 -c 1	DROPED	PASS
TCP port 137	hping3 ip -V -S -p 137 -c 1	DROPED	PASS
TCP port 138	hping3 ip -V -S -p 138 -c 1	DROPED	PASS
TCP port 139	hping3 ip -V -S -p 139 -c 1	DROPED	PASS
TCP port 515	hping3 ip -V -S -p 515 -c 1	DROPED	PASS
TCP port 32768	hping3 ip -V -S -p 32768 -c 1	DROPED	PASS
TCP port 32775	hping3 ip -V -S -p 32775 -c 1	DROPED	PASS
UDP port 23	hping3 ip -V –udp -1 -S -p 0 -c 1	DROPED	PASS
UDP port 111	hping3 ip -V –udp -1 -S -p 8 -c 1	DROPED	PASS
UDP port 137	hping3 ip -V –udp -S -p 23 -c 1	DROPED	PASS
UDP port 138	hping3 ip -V –udp -S -p 111 -c 1	DROPED	PASS
UDP port 139	hping3 ip -V –udp -S -p 137 -c 1	DROPED	PASS
UDP port 515	hping3 ip -V –udp -S -p 138 -c 1	DROPED	PASS
UDP port 32768	hping3 ip -V –udp -S -p 139 -c 1	DROPED	PASS
UDP port 32775	hping3 ip -V –udp -S -p 515 -c 1	DROPED	PASS
ICMP port 200	hping3 ip -V -1 -S -p 200 -c 1	DROPED	PASS
TCP SPOOF	hping3 ip -V -c 1 -S -s 80 -p 80 --spoof 192.168.10.5	DROPPED	PASS
TCP SYN FIN	hping3 ip -V -c 1 -s 1000 -p 80 -SF	DROPPED	PASS
UDP fragment	hping3 ip -V -S -p 22 -c 1 -f	DROPPED	

SSH out test