Kali Linux Firewall & NAT Configuration using UFW

Project Report

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Date: October 05, 2025

Duration: 1 Day

A Technical Project Report

■ Objective

To configure and secure a Kali Linux system using UFW firewall and NAT settings, ensuring controlled traffic flow and enhanced network protection.

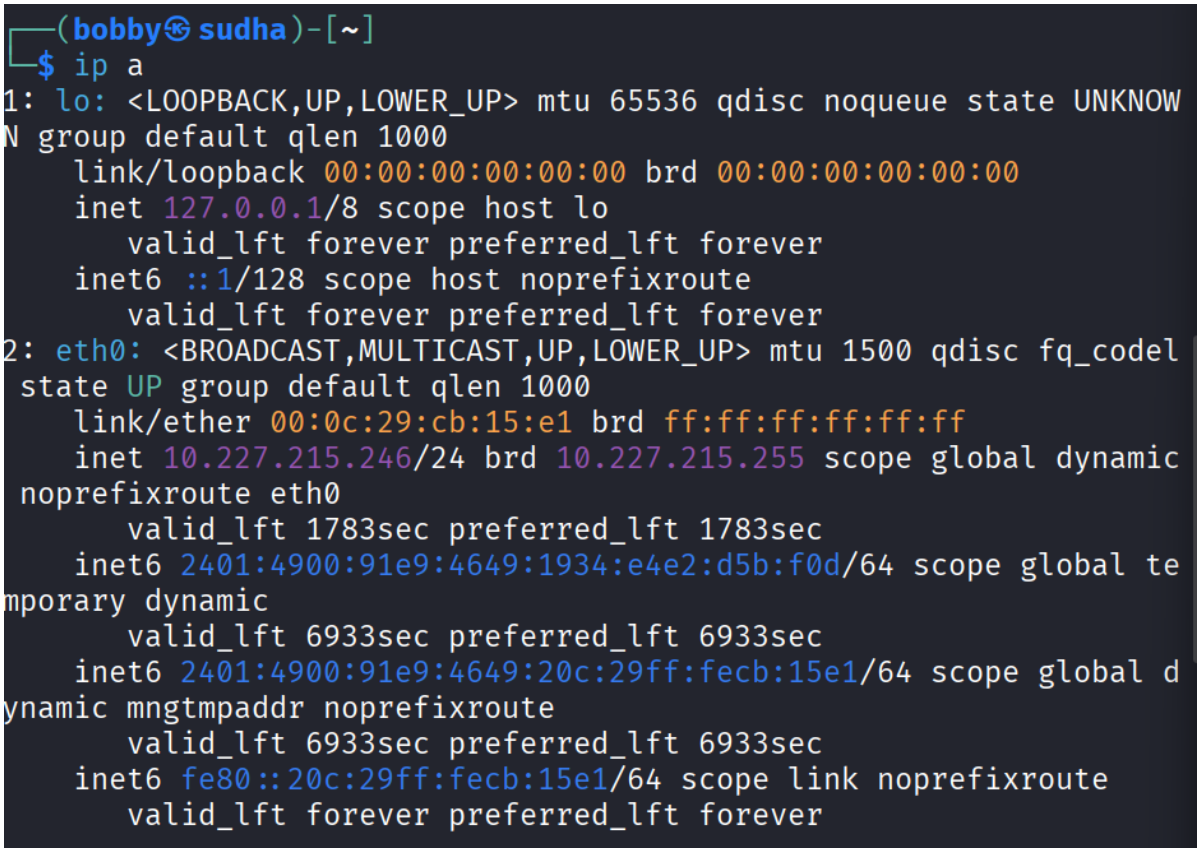
■ Tools & Environment

Operating System: Kali GNU/Linux Rolling 2024.4 **Firewall Tool:** UFW (Uncomplicated Firewall) **Text Editor:** Nano **Network Utilities:** sysctl, ftp, curl, cat **Shell:** Bash Terminal with sudo privileges **Hardware:** x86_64-based system with internet access

■ Step-by-Step Configuration

1. Check Network Interfaces

ip a



: Output showing interfaces and IPs.

2. Set UFW Default Policies

sudo ufw default deny incoming sudo ufw default allow outgoing

```
┌──(bobby㉿sudha)-[~]
└─$ sudo apt install ufw -y
Installing:
  ufw

Suggested packages:
  rsyslog

Summary:
  Upgrading: 0, Installing: 1, Removing: 0, Not Upgrading: 558
  Download size: 169 kB
  Space needed: 880 kB / 9,244 MB available

Get:1 http://kali.download/kali kali-rolling/main amd64 ufw all 0.36.2-9 [169 kB]
Fetched 169 kB in 2s (87.8 kB/s)
Preconfiguring packages ...
Selecting previously unselected package ufw.
(Reading database ... 391321 files and directories currently installed.)
Preparing to unpack .../archives/ufw_0.36.2-9_all.deb ...
Unpacking ufw (0.36.2-9) ...
Setting up ufw (0.36.2-9) ...
Creating config file /etc/ufw/before.rules with new version
Creating config file /etc/ufw/before6.rules with new version
Creating config file /etc/ufw/after.rules with new version
Creating config file /etc/ufw/after6.rules with new version
update-rc.d: We have no instructions for the ufw init script.
update-rc.d: It looks like a non-network service, we enable it.
Created symlink '/etc/systemd/system/multi-user.target.wants/ufw.service' → '/usr/lib/system
Processing triggers for kali-menu (2025.3.2) ...
Processing triggers for man-db (2.13.1-1) ...

┌──(bobby㉿sudha)-[~]
└─$ sudo ufw version
ufw 0.36.2
Copyright 2008-2023 Canonical Ltd.
```

Terminal output after setting defaults.

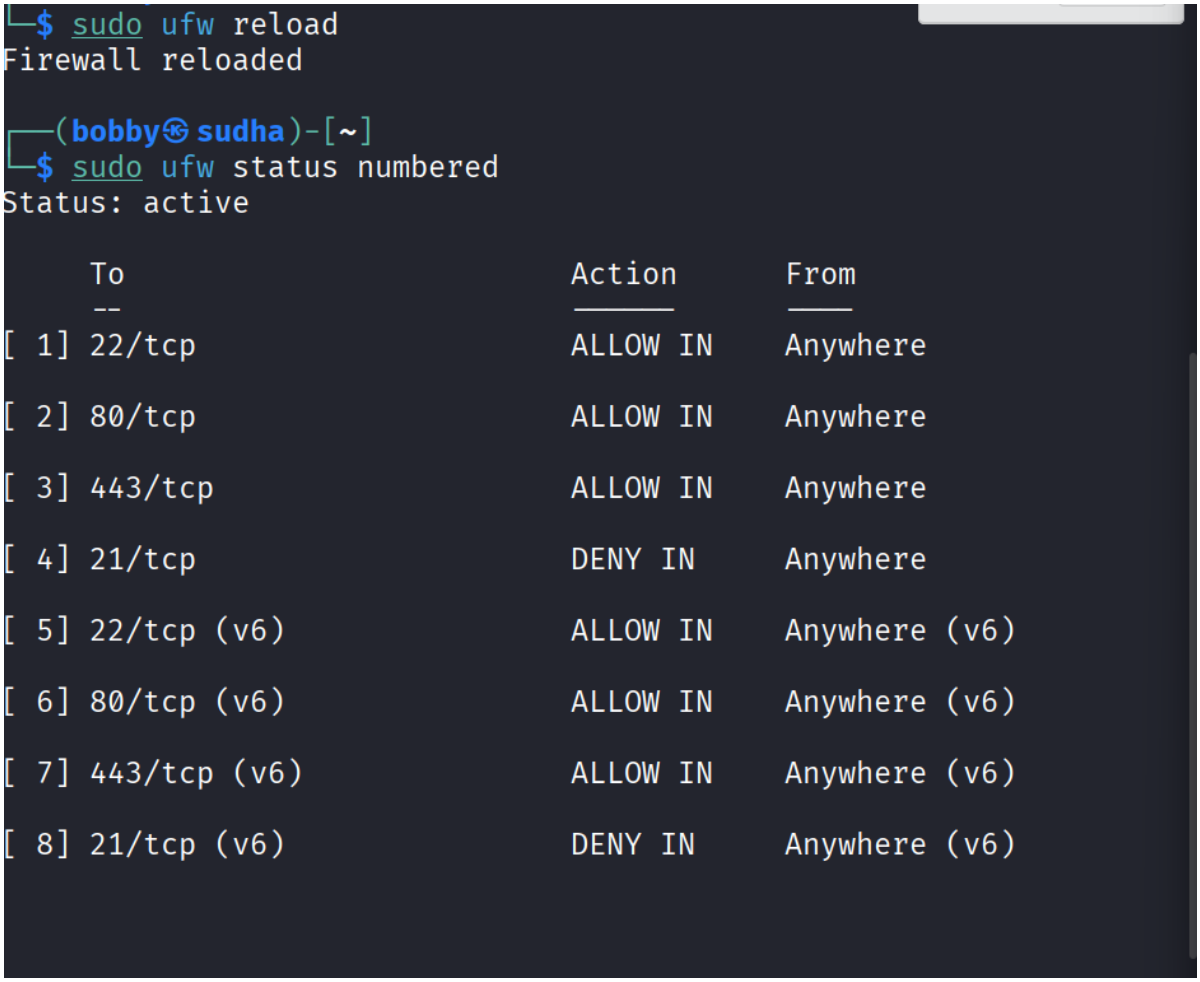
3. Allow & Deny Specific Ports

sudo ufw allow ssh sudo ufw allow 80/tcp sudo ufw allow 443/tcp sudo ufw deny 21/tcp

UFW rules list.

4. Enable the Firewall

sudo ufw enable sudo ufw status verbose



UFW active status.

5. ICMP & IP Forwarding

echo "net/ipv4/icmp_echo_ignore_all=1" | sudo tee -a /etc/ufw/sysctl.conf echo "net/ipv4/ip_forward=1" | sudo tee -a /etc/ufw/sysctl.conf sudo sysctl -p /etc/ufw/sysctl.conf

sysctl output.

6. NAT & Before Rules

sudo nano /etc/ufw/before.rules sudo ufw reload

NAT rules edited.

7. Adjust Logging

sudo ufw logging medium

Logging level change.

■ Testing & Verification Results

Verify SSH Access (Port 22)

ssh username@ ■ Should connect successfully.

SSH connection.

Verify HTTP & HTTPS (Ports 80 & 443)

curl -I http:// curl -I https:// ■ Should return HTTP headers.

curl output.

Verify FTP Denial (Port 21)

ftp ftp.debian.org ■ Connection should time out.

FTP failure.

Test ICMP Blocking (Ping)

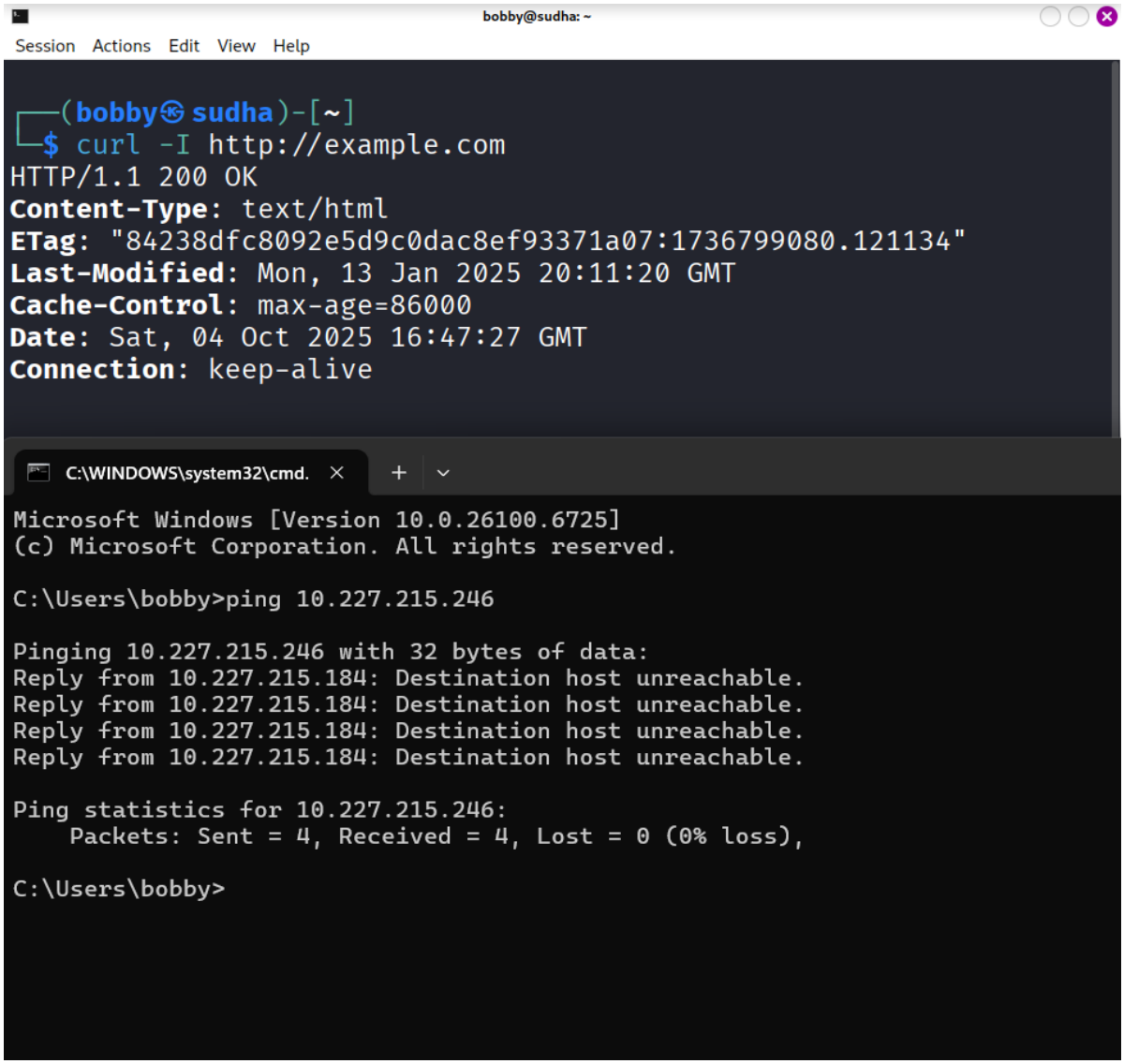
ping ■ Should not reply.

Ping timeout.

Confirm IP Forwarding

cat /proc/sys/net/ipv4/ip_forward ■ Should return 1.

IP forwarding enabled.


bobby@sudha: ~
Session Actions Edit View Help
┌──(bobby㉿sudha)-[~]
└─$ curl -I http://example.com
HTTP/1.1 200 OK
Content-Type: text/html
ETag: "84238dfc8092e5d9c0dac8ef93371a07:1736799080.121134"
Last-Modified: Mon, 13 Jan 2025 20:11:20 GMT
Cache-Control: max-age=86000
Date: Sat, 04 Oct 2025 16:47:27 GMT
Connection: keep-alive
C:\WINDOWS\system32\cmd.
Microsoft Windows [Version 10.0.26100.6725]
(c) Microsoft Corporation. All rights reserved.
C:\Users\bobby>ping 10.227.215.246
Pinging 10.227.215.246 with 32 bytes of data:
Reply from 10.227.215.184: Destination host unreachable.
Reply from 10.227.215.184: Destination host unreachable.
Reply from 10.227.215.184: Destination host unreachable.
Reply from 10.227.215.184: Destination host unreachable.
Ping statistics for 10.227.215.246:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
C:\Users\bobby>

■ Conclusion

This project successfully demonstrated the configuration and hardening of a Kali Linux firewall using UFW. Key security practices were implemented, including restrictive policies, allowing essential services, denying vulnerable services, enabling NAT and IP forwarding, blocking ICMP, and enabling logging. Testing confirmed that the firewall rules work as intended, enhancing system security and demonstrating competence in Linux administration, network security, and firewall configuration.

■ Quick Resume Add-on (Interview-Ready)

Project: Kali Linux Firewall & NAT Configuration using UFW
Duration: 1 Day
Tools: Kali Linux, UFW, sysctl, Bash Terminal
Description: Configured and secured a Kali Linux system by applying UFW firewall rules, enabling NAT and IP forwarding, and restricting unnecessary services. Verified setup with practical network tests.
Key Skills: Linux Administration · Firewall Configuration · Network Security · NAT · ICMP · SSH/HTTP/HTTPS Rules · System Hardening