

Home Lab Current-State Documentation

1. Executive Overview

This document describes the current-state architecture of my home lab environment. The lab is designed to support hands-on practice in networking, system administration, and foundational cybersecurity concepts. While the network currently operates as a flat LAN, it incorporates structured cabling, centralized equipment mounting, and perimeter firewall controls.

2. Current Network Topology

The home lab is built behind ISP-provided equipment using a double NAT configuration. All internal devices reside on a single LAN subnet and connect through a managed switch and structured patch panel.

Topology Flow:

- ISP Modem → ISP Router
- ISP Router → TP-Link ER605 (Gateway / Firewall)
- ER605 → TP-Link Managed Switch
- Switch → Patch Panel → End Devices

3. Hardware and Services Inventory

Network and Security Devices:

- TP-Link ER605 VPN Gateway acting as LAN gateway and firewall
- TP-Link managed Ethernet switch
- TP-Link Archer A8 configured in Access Point mode (mounted externally for improved wireless coverage)

Servers and Compute:

- Raspberry Pi 5 running Pi-hole for DNS-based ad and tracker filtering
- Intel N150 mini-PC running TrueNAS with a 1TB external SSD for network-attached storage

Physical Infrastructure:

- 6U 10-inch wall-mounted rack housing core networking equipment
- Labeled patch panel providing structured cabling to all devices
- Custom Ethernet cabling using Cat6 cable
- HDMI splitter and portable monitor for local management of Raspberry Pi and TrueNAS

4. Network Configuration

The current network operates on a single flat LAN design. All devices receive addressing from the same IP subnet and share a common broadcast domain.

Key Configuration Details:

- LAN subnet: 192.168.50.0/24
- Default gateway: TP-Link ER605
- No VLAN segmentation
- Managed switch used primarily for connectivity and port-level controls

5. Security Controls (Current State)

Security controls are primarily enforced at the network perimeter, with limited internal traffic restriction.

Implemented Controls:

- Stateful firewall rules on the ER605
- Basic access control lists (ACLs)
- Port security on switch access ports
- DNS-based filtering via Pi-hole

6. Operational Capabilities

- Centralized network connectivity through a managed switch and patch panel
- DNS visibility and filtering via Pi-hole
- Network-attached storage via TrueNAS
- Wireless access provided through a dedicated access point
- Hands-on experience with rack-mounted equipment and structured cabling

7. Current Limitations

- Flat network design with no internal segmentation
- All devices share the same broadcast and security domain
- Limited east-west traffic control
- Internal security relies heavily on trust rather than enforced policy
- Reduced realism compared to enterprise network architectures

8. Purpose and Next Steps

This current-state design serves as a functional baseline for the home lab. It provides a stable environment for services and connectivity while highlighting clear areas for growth. Planned upgrades include VLAN segmentation, Layer 3 switching, inter-VLAN access controls, and enhanced firewall policy enforcement.

9. Conclusion

Documenting the current-state architecture establishes a clear reference point for future upgrades. This baseline configuration supports ongoing learning and provides context for the transition to a more secure, enterprise-aligned network design.