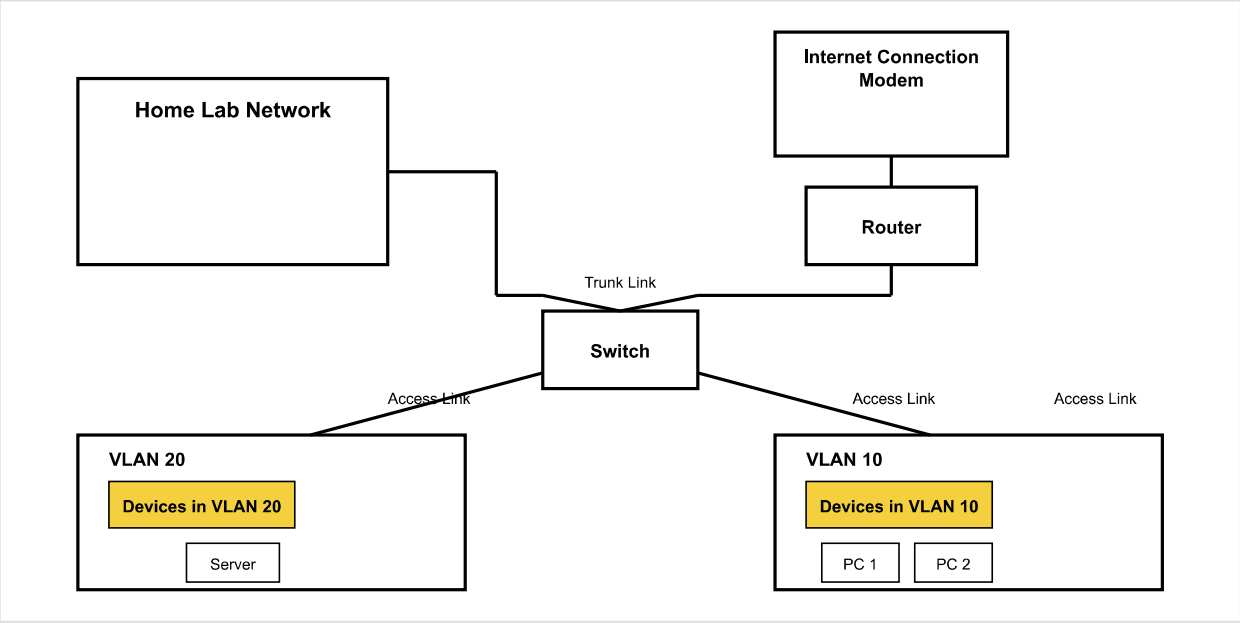
Home Lab VLAN Segmentation Worksheet

A practical guide to implementing VLANs with Proxmox and Docker

Why Use VLANs in Your Home Lab?

- Keep management interfaces isolated from container traffic
- Lock down storage protocols like NFS or CephFS behind firewalls
- Avoid cross-talk between services unless explicitly allowed
- Simulate real-world enterprise networking best practices
- Create a structure that can be documented more easily
- Enable granular firewall rules to restrict traffic types



Basic VLAN Network Topology Example

Recommended VLAN Layout

VLAN ID	Name	Purpose	Subnet
10	Management	Proxmox UI, SSH, monitoring agents	10.0.10.0/24
20	Storage	NFS, GlusterFS, CephFS, backup targets	10.0.20.0/24
30	Internal Docker	Internal-only containers	10.0.30.0/24
40	DMZ / Public	Exposed Docker services (Traefik, etc.)	10.0.40.0/24
50	Lab / IoT / Server	Test VMs, microservices, servers	10.0.50.0/24
60	Cluster Traffic	Isolate specific Proxmox cluster traffic	10.0.60.0/24
70	Live Migration	Isolate live migration traffic	10.0.70.0/24
80	Smart Home	Smart home and IoT devices traffic	10.0.80.0/24
90	Wireless	Wireless network	10.0.90.0/24
100	General LAN	General LAN traffic	10.0.100.0/24

Proxmox VLAN Configuration

Network Interface Configuration

```
auto enp3s0 iface enp3s0 inet manual auto vmbr0 iface vmbr0 inet manual
bridge-ports enp3s0 bridge-stp off bridge-fd 0 bridge-vlan-aware yes
auto vmbr0.10 iface vmbr0.10 inet static address 10.0.10.2/24 gateway
10.0.10.1 auto vmbr0.20 iface vmbr0.20 inet static address 10.0.20.2/24
```

Key Points:

- Enable "VLAN Aware" on the bridge in Proxmox GUI
- Set VLAN IDs to 2-4094 for trunk port functionality
- Use native VLAN 10 for management traffic

Docker Macvlan Configuration

Docker Compose Network Example

```
version: '3.8'

networks:
  internal_net:
    driver: macvlan
    driver_opts:
      parent: enp3s0.30
    ipam:
      config:
        - subnet: 10.0.30.0/24
          gateway: 10.0.30.1

services:
  nginx:
    image: nginx
    networks:
      internal_net:
        ipv4_address: 10.0.30.10
```

Docker Swarm Network Creation

```
docker network create -d macvlan \ --subnet=10.0.30.0/24 \ --
gateway=10.0.30.1 \ -o parent=enp3s0.30 \ docker_internal_net
```

Switch Configuration Guidelines

Port Configuration for Unifi Switch (https://ui.com/switching):

- Native VLAN: 10 (for management)
- Tagged VLANs: 20, 30, 40, 50, 60, 70, 80, 90, 100
- Set each host port to trunk mode

Example Port Assignments:

- Port 1 (Proxmox node): Native VLAN 10, tagged 20/30/40/50
- Port 2 (Docker host): Native VLAN 10, tagged 30/40

⚠️ Common Gotchas and Solutions

- **Macvlan Limitations:** Containers cannot communicate with the host by default
- **VLAN-Aware Settings:** Must be enabled in Proxmox for tagging to work
- **MTU Mismatch:** Ensure consistent MTU settings across all interfaces
- **Container Compatibility:** Some older Docker images may not work with macvlan
- **DHCP Considerations:** Macvlan networks require manual IP assignment

📝 Your VLAN Planning Worksheet

Current Network Information:

Router IP: _____

Current Subnet: _____

Switch Model: _____

Planned VLAN Implementation:

VLAN ID	Name	Purpose	Subnet	Priority
				□ Phase 1
				□ Phase 2
				□ Phase 3
				□ Phase 4
				□ Phase 5

Implementation Checklist:

- ☐ Configure switch for VLAN tagging
- ☐ Set up trunk ports for Proxmox/Docker hosts
- ☐ Enable VLAN-aware bridge in Proxmox
- ☐ Configure network interfaces on Proxmox
- ☐ Test basic connectivity between VLANs
- ☐ Implement firewall rules for inter-VLAN routing
- ☐ Configure Docker macvlan networks
- ☐ Migrate existing services to appropriate VLANs
- ☐ Set up monitoring and documentation

Useful Resources

- Docker Macvlan Documentation (https://docs.docker.com/network/macvlan/)
- Proxmox Network Configuration Guide (https://pve.proxmox.com/wiki/Network_Configuration)
- Unifi Switch VLAN Configuration (https://help.ui.com/hc/en-us/articles/360008836574-UniFi-USW-Advanced-Port-Configuration)
- pfSense Getting Started Guide (https://www.pfsense.org/getting-started/)
- Netdata Network Monitoring (https://netdata.cloud/)
- Prometheus Monitoring (https://prometheus.io/docs/introduction/overview/)
- Traefik Reverse Proxy (https://traefik.io/traefik/)

This worksheet is designed to help you implement VLANs in your home lab environment.
Start simple with 2-3 VLANs and expand as your needs grow.

Remember: Separate your general LAN traffic from server/lab traffic as a first step!