codilime

USE CASE

Enterprise VMware to Proxmox Migration at Scale

How we helped a global application security company migrate 10,000+ VMs, dramatically reduce virtualization licensing costs, and scale their network from ~4,094 VLANs to ~16 million VXLAN segments — with near-zero user-visible disruption.

CLIENT
Global application security & delivery company

INDUSTRY
Enterprise Technology

CHALLENGE
VMware licensing costs + VLAN scalability ceiling

SOLUTION
Proxmox + Ceph + EVPN/VXLAN + custom SDN orchestration

DURATION
Ongoing (phased approach)

TEAM
Infrastructure, network, software engineers, and DevOps

KEY RESULTS

What We Delivered

VLAN CAPACITY
~16M
from ~4,094

NETWORK RELOAD
< 8 min
from ~45 min

NODE RESTART
15s
from ~90s (6x)

LICENSE FEE
$0
open source

PHYSICAL NETWORK
SONiC
from Arista (EOL)

STORAGE
Ceph
from NFS

BACKGROUND

The Challenge

Our client — a global application security and delivery company — runs internal environments used every day by developers and support engineers. Every customer support case requires its own isolated L2 network, a dedicated environment replicating the customer's exact setup.

Their infrastructure relied on VLANs, and the 802.1Q standard sets a hard ceiling at around 4,094 of them. With their existing environment consuming that namespace, further growth was a pressing architectural issue. The only real solution was a move to an overlay-based model: EVPN/VXLAN, which operates on a 24-bit identifier space and supports approximately 16 million segments instead of 4,094.

VMware with NSX can support overlay networking, but NSX wasn't part of this environment, and adding it would have introduced high cost and complexity on top of licensing fees that were already difficult to justify.

We evaluated the available alternatives — OpenStack, Nutanix, Hyper-V, k8s/kubevirt — against the client's technical and commercial requirements, and recommended Proxmox. Before committing, we delivered a proof of concept to demonstrate that the requirements that Proxmox doesn't support natively could be met through platform-level engineering.

VLAN Ceiling

802.1Q hard limit of ~4,094 VLANs exhausted. Each customer case needed its own isolated network segment.

Rising Costs

VMware licensing costs climbing at scale. Open-source alternatives needed evaluation and validation.

L2 Requirements

Client needed L2 network exposure across wide range. VMware's L3-oriented stack without NSX couldn't deliver.

MIGRATION JOURNEY

1

Assessment

Thorough evaluation of OpenStack, Nutanix, Hyper-V, and Proxmox against networking and scalability requirements

2

Proof of Concept

Validated Proxmox at enterprise scale, confirmed custom networking extensions can meet all requirements

3

Phase 1

VMware ESXi to Proxmox + NFS to Ceph migration across multi-node clusters

4

Phase 2

EVPN/VXLAN overlay deployment, SONiC switching, GitOps network automation

5

Support

Ongoing managed services and maintenance for the custom-extended platform

OUR APPROACH

The Solution

1 Getting off VMware

- Migrated virtualization from VMware ESXi to Proxmox VE 9.x across multiple clusters, the largest running 32 nodes
- Replaced NFS-based storage with hyperconverged Ceph, natively supported by Proxmox, enabling faster VM creation
- Cluster and node deployment fully automated with Ansible
- Integrated Proxmox into client's existing internal Automation Portal — workflow unchanged for end users
- Ran extensive scale and stress testing to check behavior in production
- Network topology deliberately preserved to keep migration low-risk

2 Rebuilding the Network Foundation

- Implemented EVPN/BGP as control plane for VXLAN — expanding from ~4,094 VLANs to ~16 million VNIs
- Each customer case receives its own full pool of up to 4,094 VLANs — complete network isolation per case
- Built dynamic network configuration driven by GitOps and source-of-truth automation
- Vendor research along with SONiC research to replace existing EoL infrastructure while keeping all features intact. Open standards such as EVPN avoid vendor lock-in going forward

Code-Level Proxmox Optimization

In an environment running 32 nodes with thousands of network objects per host, Corosync heartbeats and the PMXCFS cluster filesystem required careful tuning to maintain stable quorum and performance at scale. Beyond that, we built capabilities that didn't exist in Proxmox before this project.

Network restart optimization
Per-node network reconfigure time reduced from ~90 seconds to ~15 seconds, cutting full-cluster network reload from ~45 minutes to under 8.

Selective restart
Rather than restarting the entire cluster on a configuration change, we built logic to identify and restart only the affected nodes.

Custom SDN extensions
Each client-created network operates as a fully independent context with its own complete VLAN pool — a significant departure from stock Proxmox SDN, which provides only a single VLAN for each network in the zone.

Custom integration layer
Built a custom integration layer based on kernel netlink API, fully transparent to Proxmox, providing event-driven orchestration that communicates with the client's Automation Portal in real time.

INFRASTRUCTURE

Technology Stack

VIRTUALIZATION
Proxmox VE 9.x
KVM + LXC

STORAGE
Ceph
Hyperconverged

NETWORK OS
SONiC
Open-source NOS

OVERLAY
EVPN/VXLAN
~16M VNIs

AUTOMATION
Ansible
IaC provisioning

CONFIG MGMT
GitOps
Source of Truth

INTEGRATION
Portal API
Client's portal

CUSTOM
Netlink Agent
SDN ext. + daemon

Before & After

LAYER	BEFORE		AFTER
Virtualization	VMware ESXi	→	**Proxmox VE**
Storage	NFS-based	→	**Ceph**
Switching	Arista (EOL)	→	**SONiC**
SDN / Overlay	VLAN-based (no NSX)	→	**EVPN/VXLAN + custom**
Automation	Manual / limited	→	**Ansible + GitOps**

SOLUTION ARCHITECTURE LAYERS

Application	Client's Automation Portal + Custom APIs
Orchestration	Netlink Agent + Proxmox SDN Extensions + Ansible
Network	EVPN/VXLAN Overlay (FRRouting) + SONiC Physical
Storage	Ceph (Hyperconverged, native Proxmox integration)
Compute	Proxmox VE 9.x — 32-node clusters, 10,000+ VMs

OUR DIFFERENCE

Why CodiLime

A project like this one requires more than a systems integrator who can follow a migration guide. It requires engineers who will go into a platform's source code when the platform isn't enough, and who can design for requirements that don't have an off-the-shelf answer.

That's what this project was. Proxmox didn't natively support everything this environment needed. Rather than working around those gaps or recommending a more expensive alternative, our engineers extended the platform directly, building capabilities that didn't exist in it before.

Network infrastructure (SDN, EVPN, VXLAN, L2/L3 design) is core to what we do, not an adjacent service. That depth is what made the Phase 2 network redesign possible at this scale.

When the project scope needed to shift mid-delivery, limiting Phase 1 to reduce risk, we restructured without losing the end goal.

CodiLime provides ongoing support and managed services for the environments we build, so you aren't left on your own maintaining something without vendor support.

SOUNDS FAMILIAR?

Is This Relevant to You?

This project isn't unusual. The combination of rising VMware costs and legacy network architecture hitting its limits is something we're seeing across infrastructure teams right now.

If any of these apply to you, it's worth a conversation:

- You're facing VMware licensing costs that are increasingly hard to justify
- You run large-scale lab, dev, or test environments that need to grow
- You're approaching the limits of your VLAN-based network design
- You want to move to open-source virtualisation without losing enterprise-grade capability
- You need SDN functionality that Proxmox doesn't support out of the box

Contact Us to Discuss Your VMware Migration Strategy

Our team has the infrastructure, networking, and software engineering depth to make it work at your scale.

Contact Us

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