VMware Cloud Foundation Networking (NSX)

High-Performance Networking for VMware Cloud Foundation

AT A GLANCE

VMware Cloud Foundation Networking (NSX) delivers the simplest connectivity and operational model for workloads running on VMware Cloud Foundation, allowing you to deploy and scale traditional and modern applications in the private cloud.

KEY BENEFITS

- Deliver network connectivity and services for VCF workloads over any switch fabric, unifying network configuration, visibility, and troubleshooting across both virtual and physical workloads
- Simplify network design and capacity planning with the ability to seamlessly move workloads to the optimum host without any changes to the underlying physical network
- Ensure infrastructure resiliency with simplified architecture and workflows for disaster recovery, and reduced frequency of unplanned outages
- Reduce overall TCO of private cloud with server consolidation, faster network provisioning, automation, and increased operational efficiency
- Future-proof your infrastructure investments with support for both traditional and cloud-native apps on VCF

VMware Cloud Foundation Networking (NSX)® enables high performance networking, multi-tenant operations, and a simplified network connectivity model for VCF workloads. It interoperates with leading switch fabric management solutions from Arista Networks, Cisco, and SONiC to provide consistent architecture, configuration, and operations for both virtualized and physical workloads. Network services are delivered close to the workload, enabling efficient traffic forwarding and simpler network segmentation. Administrators can create and provision connectivity – along with the rest of the infrastructure – in seconds using VMware Cloud Foundation Automation. They can use Virtual Private Clouds (VPCs) to create isolated environments, set resource boundaries, and provide self-service access to resources and network services for application teams. Application teams get access to services without going through a complex ticketing process while maintaining compliance.

Finally, networking can scale seamlessly along with the rest of the VCF stack, simplifying cluster creation and consumption. Configurations for SSO, identify, certificates, tags, tenancy, and chargeback are synchronized across the stack, greatly simplifying operations.

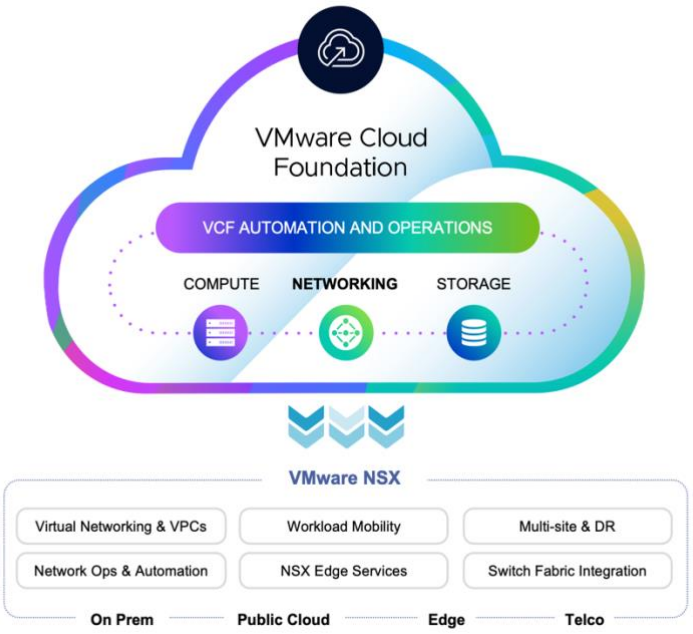

Figure 1: VMware Cloud Foundation Networking

Flexible, high-performance networking for VCF workloads

VMware Cloud Foundation Networking provides a complete set of logical networking capabilities and services, including logical switching, routing, load balancing, virtual private cloud (VPC), virtual private network (VPN), and monitoring. These services are provisioned with the rest of the VCF stack and deployed non-disruptively over any existing network fabric.

Key Features[1]	
Virtual Private Cloud (VPC)[2]	A secure, isolated private cloud construct that offers a standardized, simple and powerful cloud networking experience across VCF that allows easy deployment networking and security. VPCs can be deployed and consumed from VMware Cloud Foundation Automation and vCenter. This allows self-service consumption and scaling of networking and security while also implementing the necessary isolation and resource quotas in a multi-tenant model.
Ethernet VPN (EVPN)	EVPN is an industry-standard network fabric architecture that allows you to build a modern, scalable private cloud. It combines with VXLAN to solve the scale and resiliency limitations of traditional networking. The VCF implementation of EVPN is compatible with certain switch fabric solutions from Arista, Cisco, and SONiC.[3]
Switching	Enable logical Layer 2 overlay extensions across a routed (Layer 3) fabric within and across data center boundaries.
Transit Gateway	Transit Gateways (TGWs) simplify and streamline inter-VPC and VPC-to-external network communication by acting as a central hub for routing traffic. The Transit Gateway can be either centralized or distributed. The distributed mode simplifies VPC connectivity from the host to the physical fabric while the centralized mode offers additional network services like BGP.
VPC Policy-based Connectivity	VPC policy-based connectivity allows customers to define and enforce granular connectivity and isolation for VPCs and services. It uses the concept of “VPC Communities” to enforce workload connectivity rules within VCF. This policy-based approach allows the use community profiles to control communication between different VPCs without needing any network changes (such as Transit Gateway Connectivity) or additional firewalling.

[1] For detailed feature capabilities and entitlements, please refer to NSX Feature and Edition Guide

[2] For configuration maximums, please refer to the VMware Configuration Maximum Tool

[3] Please contact your VMware representative for more details.

Enhanced Data Path (EDP)	Enhanced Data Path (EDP) provides a high-performance fast path for network flow processing, designed to provide superior performance in terms of throughput, packet rate, latency, and CPU utilization.
DPU-based acceleration for NSX[4]	Delivers high performance networking and security services implemented on DPUs connected to the application hosts. Offloading networking services from the hypervisor to DPU frees up host computing resources, enabling accelerated switching and routing, high performance security, and enhanced observability while preserving your existing networking user experience.
Routing	Dynamic routing between virtual networks that is performed in a distributed manner in the hypervisor kernel, and scale-out routing with active-active failover with physical routers. Static routing and dynamic routing protocols are supported, including support for IPv6.
IPv6	VCF Networking supports Internet Protocol version 6 (IPv6) in the data and management plane, enabling enterprises and service providers to meet mixed IP addressing needs as they build out services at scale. VCF Networking supports IP addressing and NAT services for both IPv6 only and dual-stack deployments.
Virtual routing and forwarding (VRF)	Complete data plane isolation among tenants with a separate routing table, network address translation (NAT), and edge firewall support in each VRF on the NSX Tier-0 gateway.
NSX Edge Node[5]	Support for L2 bridging between VLANs configured on the physical network and virtual networks, L3 gateway connectivity with dynamic routing, all providing seamless connectivity between virtual and physical workloads.
VPN	Site-to-site and unmanaged VPN for cloud gateway services.
Federation	Centralized policy configuration and enforcement across multiple locations from a single pane of glass, enabling network-wide consistent policy, operational simplicity, and simplified disaster recovery architecture.
Cloud networking	Enable consistent networking across data center sites, and across private and public cloud boundaries, irrespective of underlying physical topology or cloud platform.

[4] Supports several leading DPU/NIC vendors and server OEMs. Please contact your VMware representative for more details.
[5] L2, L3 and NSX gateway integration only. No consumption of security groups.

Multi-tenancy[6]	Enable multi-tenant deployment and consumption of networking services for the Enterprise Admin (Provider) and the Project users (Tenants). The Provider can create Projects, assign users and groups, and allocate quotas to restrict the configurations available to the Tenants.
Container Networking	VMware NSX Container Plugin provides container networking for VMware vSphere Kubernetes Service (VKS), formerly known as Tanzu Kubernetes Grid service (TKGs), to provide an Enterprise-grade Kubernetes networking solution integrated natively in VMware Cloud Foundation. VMware Container Networking™ with Antrea™ provides in-cluster networking and Kubernetes network policy with commercial support and signed binaries. Integration with VCF Networking provides multi-cluster network policy management and centralized connectivity troubleshooting via Traceflow through the networking management plane.
Modern REST API	RESTful API based on JSON for integration with cloud management platforms, DevOps automation tools and custom automation.
Automation[7]	Native integration with VMware Cloud Foundation Automation™ for full-stack automation with VPCs and Transit Gateways. Fully supported Terraform provider and PowerShell integration.
Network Operations	Native operations capabilities such as central CLI, Traceflow, overlay logical SPAN and IPFIX to troubleshoot and proactively monitor the virtual network infrastructure. A System Health page centralizes monitoring of the overall health of management cluster, transport nodes, and edge nodes with quick insights into status, alarms, resource utilization, API usage, and compute manager reachability. Integration with VMware Cloud Foundation Operations™ for networks[8] delivers advanced visibility, analytics, and troubleshooting.

[6] For configuration maximums, please refer to the VMware Configuration Maximum Tool
[7] For more information, please see the VMware Cloud Foundation Automation datasheet
[8] For more information, please read the VMware Cloud Foundation Operations for networks datasheet

Integrated Cloud Operations	Unified fleet management capabilities in VMware Cloud Foundation Operations[9] simplify infrastructure deployment and operations. Native integration of networking in the VMware Cloud Foundation installer workflows simplifies network deployment from scratch or from an existing deployment. NSX Manager is installed along with other components so that the VMware Cloud Foundation environments is ready for virtual networking features such as VPCs. License and certificate management, single sign-on identity access, configuration drift detection, password management, and tags are unified across the VMware Cloud Foundation infrastructure.

[9] For more information, please see the VMware Cloud Foundation Operations datasheet

Resources

VMware Cloud Foundation datasheet

VMware Container Networking with Antrea datasheet

VMware Cloud Foundation Operations for networks datasheet

VMware vDefend Firewall datasheet

VMware Avi Load Balancer datasheet

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Key Enablers of VMware Cloud Foundation Outcomes

Build a Modern Infrastructure

a. Scalable Unified Network Fabric: VCF Networking provides strong interoperability with leading switch fabric solutions using EVPN-VXLAN based connectivity. This allows VPC connectivity to be pre-provisioned, simplifying workload connectivity for the VCF admin while also enabling higher network throughput.

b. Multi-Tenant Network Operations: Virtual Private Clouds (VPCs) deliver network self-service and multi-tenant operations that enable IT to rapidly deliver new digital services built on traditional and modern workloads. Federation improves operational efficiency with centralized policy, management and visibility across multiple sites. Comprehensive monitoring and troubleshooting tools enhance visibility and allow quick resolution of issues, while unified operations streamline management across diverse workloads and environments.

c. Extensible Automation: VCF Networking offers a single, declarative API enabling definition and management of granular networking and security policies for VM and containerized workloads. Tight integration with VMware Cloud Foundation Automation enables end-to-end automation of network workflows, from provisioning to lifecycle management across VCF.

Deliver a Unified Cloud Experience

a. Rapid Network Provisioning and Compliance: Projects and Virtual Private Clouds (VPCs) reduce provisioning time to minutes. Cloud admins can create and isolate tenant environments, implement resource quotas, and delegate access so that networking and security services can be easily consumed by application teams without elaborate IT intervention. VPCs can be spun up on-demand in minutes along with the appropriate VPC to VPC security controls using VPC Communities.

b. Cloud-like Experience for Application Teams: Just like public clouds, developers and DevOps teams get self-service capabilities to create, modify, or tear down networks in the private cloud as needed without complex ticketing processes, accelerating the development process. Support for Infrastructure as Code enables developers to define and manage networking resources programmatically, integrating directly into CI/CD workflows to streamline application deployment.

Implement a Secure and Resilient Platform

c. Disaster Recovery, Site Migration, and Non-Disruptive Testing: VCF Networking significantly enhances disaster recovery capabilities in VMware Cloud Foundation through its comprehensive feature set including NSX Federation, policy compliance, network encryption, and integration into VMware Advanced Cyber Compliance (ACC).

d. Platform and Network Security: VCF Networking implements robust encryption for network communications, integrates with modern identity providers for enhanced authentication, and granular access management through Role-Based Access Control (RBAC). Platform Certifications based on third-party security validation of the NSX platform include FIPS, DISTA, NIAP and EAL. Network security is further enhanced with the VMware vDefend add-ons including the vDefend firewall for fine-grained network segmentation and micro-segmentation, distributed Intrusion Detection and Prevention System (IDS/IPS), and Network Detection and Response (NDR).

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