

# VMWARE VCLLOUD NFV OPENSTACK EDITION

## AT A GLANCE

VMware vCloud NFV is a fully integrated, modular, multi-tenant Network Functions Virtualization (NFV) platform. It provides compute, storage, networking, management and operational capabilities enabling operators to simplify, scale, and secure production NFV services. The transformative platform allows Communications Service Providers (CSPs) to accelerate time to market and increase revenue with new services, streamline operations, reduce network infrastructure costs, and deploy elastic business models for telecommunication workloads.

## KEY ENHANCEMENTS

- **Higher performance and scale** leveraging high performance switching in N-VDS (E), SR-IOV, Direct Passthrough, huge pages, bare metal NSX Edge, compute alignment, and VM instant cloning
- **Greater security** through micro-segmentation for VMs and containers, RBAC, and API rate limiting
- Guaranteed resource isolation and SLAs in **multi-site, multi-tenant topologies** through tenant-specific virtual data centers
- **Carrier-grade networking** with 2-tier routing with NSX-T, Bidirectional Forwarding Detection (BFD), and container networking
- **Small form-factor ready** platform for low footprint deployments with VMware Integrated OpenStack-in-a-box and container support
- **Intent-based service assurance** for streamlined operations using intent-based planning and forecasting, predictive capacity analytics, and dynamic performance optimization.

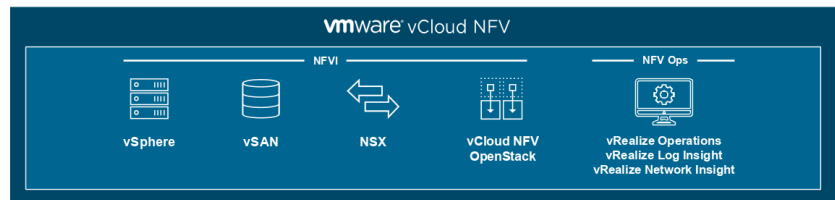


FIGURE 1: VMware vCloud NFV OpenStack Edition

## VMware vCloud NFV: Enabling 5G-ready Telco Clouds

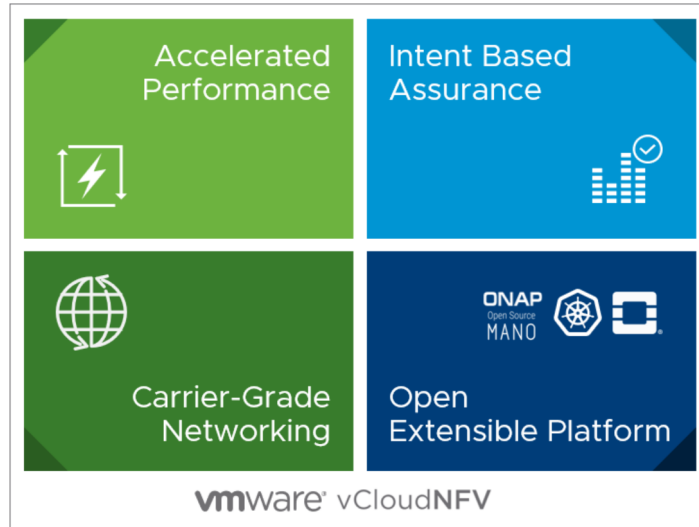
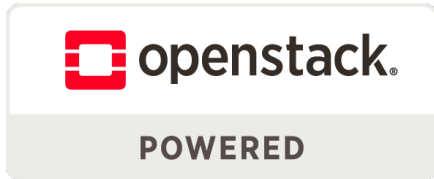
NFV objectives have evolved quite significantly from the initial need for CSPs to virtualize the infrastructure. Future growth of CSPs lies in scaling with products and services into new and adjacent markets. There is an acute focus on overall operational transformation with CSPs wanting to drive continuous innovation and rapid service deployment for 5G and IoT services. With applications and services demanding larger bandwidth and ultra-low latency, CSPs are deploying applications, services, and greater network intelligence at the Edge to deliver higher QoE. The implementation of applications (VNFs) delivering low latency is directly correlated to the underpinning NFVI platform where techniques such as DPDK reduce latency through accelerated packet processing.

VMware vCloud NFV is a modular NFV platform that several of the world's leading CSPs rely on to develop modern cloud computing stacks to support new revenue streams while lowering costs. It is an open standards-based NFVI platform that supports a broad set of VNF applications, creating a large ecosystem for CSPs to deliver innovation at a rapid pace at scale. Its flexible platform architecture allows CSPs to deploy applications and services today for 4G networks, deploy services at the edge, and then seamlessly migrate to 5G networks.

vCloud NFV OpenStack Edition includes several new capabilities that allow CSPs to quickly introduce and have full control over distributed micro data centers and apps at the edge via automated API-driven orchestration and lifecycle management. CSPs can now accelerate service creation, VNF on-boarding processes, and infrastructure management with carrier-grade availability, performance, and service continuity. vCloud NFV OpenStack also features advanced and unique operations management with 360-degree visibility and proactive and predictive analytics offering fast remediation capabilities that deliver operational excellence.

### Core Capabilities and Benefits

VMware vCloud NFV provides advanced features and capabilities in four broad categories:



#### ACCELERATED PERFORMANCE BENEFITS

- Proven high-availability platform with high service availability and continuity
- Improved throughput and scalability for enhanced VNF performance
- Greater compute density while optimizing hardware resources and overall network support costs
- Improved VM and application uptime with the ability to create snapshots, clones and backups
- Enhanced platform awareness for high subscriber QoE by dynamically optimizing resource utilization to adapt to traffic conditions

#### Accelerated Performance

A key aspect of transforming carrier-grade networks to meet current and 5G-ready use cases across core and edge is to architect the network for optimum application response times, scale, service continuity, and SLAs. vCloud NFV delivers a carrier-grade NFVI platform with continuous availability, service continuity, breakthrough network performance, and simplified management, enabling operators to achieve significant improvements in data plane performance, resource scaling, and service availability. vCloud NFV accomplishes this by offering:

- NSX managed Virtual Distributed Switch in Enhanced Data Path mode (N-VDS (E)) that leverages DPDK techniques to provide fastest virtual switching fabric on vSphere
- Low latency data-plane through Enhanced Platform Awareness including CPU pinning, fine-grained NUMA placement, vertical NUMA alignment, and support for multiple NIC types
- Elastic Multi-Tenant Resource Scaling that provides resource guarantees, isolation, scaling, and availability for each tenant
- Advanced high-availability via intelligent predictive analytics based on VNF requirements
- Predictive Distributed Resource Scheduler (pDRS) to proactively monitor VNFs and resources and deliver closed loop remediation
- Advanced tuning parameters for enhanced performance, including native Intel NIC drivers for VMware vSphere and VRDMA for east-west traffic optimization
- Scalable routing with baremetal Edge and enhanced platform resiliency through the separation of data, control and management planes
- Rapid instant cloning of VMs for scale-out orchestration and just-in-time provisioning

### CARRIER GRADE NETWORKING BENEFITS

- Complete multi-tenant service separation across NFVI functions (virtual compute to networking)
- Reduced costs through consolidated network functions in NSX including firewall and load balancing
- Simplified configuration and administration of QoS profiles for applications
- Enhanced network resiliency and distributed stateful firewalling
- Cross-cloud and native PaaS support (PCF)

### INTENT BASED ASSURANCE BENEFITS

- Assured application performance based on business and operational intent
- Increased capacity utilization without causing resource contention
- 360-degree visibility with real-time insights, root cause analysis and remediation
- Reduced operational costs through real-time predictive analytics, contextual troubleshooting workflows, and closed loop automation using vRealize Orchestrator
- Active remediation of workloads and northbound integration with OSS/BSS and third-party solutions

### Carrier Grade Networking

CSPs are increasingly seeking networking and security platforms that provide consistent connectivity, QoS, integrated security, and inherent automation to operate a robust end-to-end architecture that delivers applications and services, when and where needed. vCloud NFV facilitates this fundamental shift in networking capabilities by delivering:

- NSX-T network virtualization that programmatically manages software-based virtual networks that include virtualized switching, routing, firewalling, and load balancing
- Context-aware NSX micro-segmentation to deploy security policies both within and between VNFs in both VM and container form factors
- Bidirectional Forwarding Detection (BFD) of link failures for increased network resiliency
- Distributed stateful firewalling, DNS as a Service (DNSaaS), and Load Balancer as a Service (LBaaS) for L4-L7 load balancing, eliminating the complexities of deploying third party solutions
- Consistent allocation and enforcement of network bandwidth, throughput, latency, and other network resources in VMware NSX-T

### Intent based Assurance

CSPs are often constrained by traditional operating models which may have worked for a specific pre-defined set of services but were rigid and inflexible. Deploying new services on-demand, with real-time scaling, monitoring, and remediation, has now become imperative. With intent-based assurance, vCloud NFV introduces a new paradigm in network operations that delivers:

- Automatic placement and rebalancing of workloads across clusters and datastores to avoid resource contention and ensure performance
- Automated moving of VMs including Distributed Resource Scheduler (DRS) levels, predictive DRS, storage DRS, storage policies and target utilization levels
- Intent-based policies for SLA, application license, forecast, and cost
- Real-time predictive capacity analytics to improve capacity utilization, capacity risk detection, automatic resource reclamation, and right sizing of resources
- Deep network visibility with automatic topology discovery, converged overlay and underlay visibility, and real-time network insights via vRealize Network Insight
- Extensible operations management with APIs for northbound integration and automation
- Advanced workload analytics, predictive resource scheduling and balancing, and high-scale monitoring for VMs and containers

## OPEN AND EXTENSIBLE PLATFORM BENEFITS

- Streamlined multi-VNF on-boarding on an open and extensible platform
- Ease of deployment with predictable resource consumption
- Scalable infrastructure management and automation
- Over 45% lower cumulative TCO over 5 years of operations
- Open platform with carrier-grade functionality for greater scale, performance and resiliency
- Deployment ready VNFs that have undergone comprehensive testing and certification with the VMware Ready for NFV program

## HOW TO BUY

The VMware vCloud NFV bundle runs on a broad set of x86-based platforms, and includes carrier-grade support services for commercial-scale deployments. With a single purchase, CSPs can deploy an NFV platform that supports applications at all stages of NFV evolution. vCloud NFV is designed for vSphere environments and available as a single bundle.

## CARRIER-GRADE SUPPORT

VMware offers a broad spectrum of support options, ranging from self-help and basic support to business and mission critical offerings, including:

- Add-on services to Production Support
- New SLAs for service restoration of NFV platform
- MCS SLAs for enterprise environments
- Dedicated support teams, 24/7
- Dedicated Service Account Manager
- Enhanced proactive and reactive support
- Limited onsite support as required, or option to purchase on-site resident assistance

## Open and Extensible Platform

To maximize the benefits of NFV, CSPs are looking for ways to increase the flexibility and efficiency with which they bring new services and applications to market, and there is need for the use of open, virtualized, and cloud-native application designs. Also important is the ability to programmatically deploy service components, anywhere from the data center to cloud, to branch, and the edge, and across different technologies including VMs, bare metal, and containers in an extensible ecosystem. vCloud NFV features enable operators to accomplish these goals through:

- VMware Integrated OpenStack, based on latest OpenStack Queens release, and Kubernetes
- Open and extensible APIs and SDKs to manage the VNF lifecycle and runtime operations
- HEAT & YAML based automated importing of VNF workloads and policies
- Cloud-native & hybrid form-factor execution environments, including support for container networking (NCP plug-in)
- A mature NFV ecosystem of certified VNF partners and a comprehensive testing and certification program
- VIDM Integration and Keystone Federation

## vCloud NFV: Distinct Advantages

The VMware vCloud NFV platform is uniquely capable of empowering CSPs to achieve the full benefit of NFV. Its combination of modularity, freedom of choice through open standards and multi-vendor VNF support, mature ecosystem, future-ready agility, and carrier-grade support distinguish it from other offerings. Other advantages include:

- **Flexible deployment and management tools:** vCloud NFV employs a single architecture to manage multiple VIMs, adding flexibility to deployment and management.
- **Deep visibility and insight:** vCloud NFV provides holistic, 360-degree visibility and insight into all network layers along with smart alerts and recommendations.
- **NFV ready certification:** VMware has the largest number of certified VNF partners and comprehensive testing and certification with the VMware Ready for NFV program.
- **Proven in production:** vCloud NFV has been deployed in over 120 product implementations in over 59 operators supporting over 400M subscribers
- **Fast access to skilled resources:** CSPs can quickly and easily deploy vCloud NFV in their network with the current talent pool in their organization, due to the large number of VMware-certified individuals working across IT and network organizations.

---

## Learn More

For additional information about VMware vCloud NFV, call 1-877-VMWARE (outside North America, dial +1-650-427-5000), visit <http://vmware.com/go/nfv>.

