Networking in VMware Cloud Foundation with VMWare NSX

VMware Cloud Foundation

VMware Cloud Foundation provides a flexible and simplified private cloud platform with public cloud extensibility that integrates leading products including vSphere (compute), vSAN (storage), NSX (networking) and Aria (management) into a single solution.

VMware NSX

VMware NSX Network Virtualization brings the simplicity of a cloud operating model to networking in VMware Cloud Foundation (VCF), allowing you to streamline, accelerate and scale both traditional and modern applications in private clouds.

VMware NSX® is a network virtualization solution for VMware Cloud Foundation™ (VCF). It uses a software-defined approach to networking that spans data centers, clouds and application frameworks. VMware NSX brings networking services closer to the application, whether running on virtual machines (VMs), containers or physical servers. This allows for a cloud operating model where networks can be provisioned and managed independently of the underlying hardware.

VMware NSX replicates the entire network model in software, enabling any network topology—from simple to complex multitier networks—to be created and provisioned in seconds. Users can create multiple virtual networks with diverse requirements, leveraging a combination of the services offered via VMware NSX or from a broad ecosystem of third-party integrations to build inherently more agile and secure environments. These services can then be extended to various endpoints within and across clouds.

Addressing competing infrastructure demands

Application agility, scale and high availability are top priorities for IT organizations. A solid application infrastructure serves as the foundation for their digital transformation journeys. However, the fast pace of change and shifting expectations can lead to constantly changing priorities.

IT needs the ability to accommodate multiple stakeholder demands and often has to make tough decisions to prioritize goals. Compromises are frequently made for application availability across environments, effectively placing IT at odds with the broader organization and vice versa. This constant tension has significant consequences for IT, leading to severe deficiencies in multiple areas of responsibility. This includes organizations' inability to meet demands quickly, vulnerabilities across the data center and cloud environments, and an overall lack of agility.

Key benefits

Speed and Automation – Reduce network provisioning time from days to seconds and improve operational efficiency using automation. Add self-service for developer agility using Virtual Private Clouds (VPCs) on-prem.

Consistent Policy and Operations – Consistent networking and security policies are maintained regardless of the underlying physical network topology, spanning across data centers, private clouds and application frameworks.

Network and Application Resiliency – Ensure the resiliency of network infrastructure and services by implementing simplified disaster recovery and application mobility.

Lower CapEx and OpEx – Decrease capital and operational expenses to minimize the total cost of ownership for private cloud implementations.

Support Traditional and Modern Applications – Future-proof your infrastructure investments with support for any application running on VMware Cloud Foundation, whether traditional or containerized.

Unlocking the full potential of private cloud

Most organizations have already virtualized compute components in their data centers. Additionally, many organizations have chosen to virtualize storage, with over 70 percent already having adopted or planning to adopt software-defined storage. Virtualized networking is next.

The abstraction of functionality from hardware into software allows organizations to rapidly provision application components, move virtual systems between data centers and automate critical processes. By virtualizing switching, routing, compute and storage, the full benefits of a software-defined data center can be achieved.

The fact is that organizations with hardware-based network architectures cannot match the speed, agility or security of those deploying virtualized networks.

A fundamentally new approach to data center networking is needed. As thousands of organizations have realized, network virtualization is that new approach.

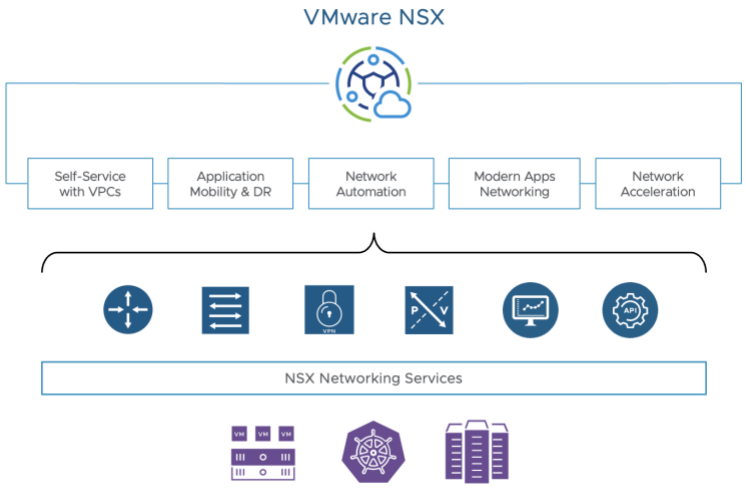

Figure 1: VMware NSX for VMware Cloud Foundation Networking

Network virtualization delivers networking and security services in software, allowing IT to quickly create, store, and manage entire application environments, similar to spinning up virtual machines (VMs). VMware NSX extends networking and security policies consistently across different environments and application frameworks, including data centers, private clouds, and traditional and modern applications.

With VMware NSX, IT becomes a catalyst for innovation within the organization, embracing the requests of multiple stakeholders instead of treating them as conflicting and mutually exclusive. Not only is IT

Key features

L2-L7 Network Stack and Overlay Services: Efficiently deploy new services within seconds using a highly scalable, automated layer-2 to layer-7 networking solution.

Multi-Site Networking and Disaster Recovery: Manage networking in a consistent manner across multiple environments from a centralized console. Keep configuration and operational state synchronized and simplify disaster recovery.

Self-Service Virtual Private Clouds (VPCs): Utilize multi-tenancy and VPC structures to create a self-service environment for application teams.

Network Automation with Declarative APIs: Accelerate network service delivery using declarative policy APIs to simplify network consumption and operations with an intent-based approach.

Streamlined Monitoring and Troubleshooting: Utilize a centralized dashboard for monitoring network performance, scalability and alerts. Take advantage of advanced troubleshooting, including live traffic analysis and time series metrics.

able to provide unprecedented levels of application agility, but it can also do so at a pace that matches the needs of the business.

Network automation

Network automation speeds up application deployment substantially by removing manual, error-prone network provisioning tasks.

VMware NSX can manage the provisioning, deployment, operations and retirement of networking infrastructure and applications from a central control pane. You can automate infrastructure operations and offload manual tasks with advanced workflows and agile templating using tools such as VMware Aria Automation, Terraform and Ansible.

VMware NSX abstracts network services from the underlying hardware, enabling programmable infrastructure through APIs. This allows for dynamic provisioning, configuration, and management of network resources, reducing manual intervention and accelerating service delivery. You can implement policies and workflows to automate tasks like network provisioning, security enforcement, load balancing, streamlining operations, and improving efficiency.

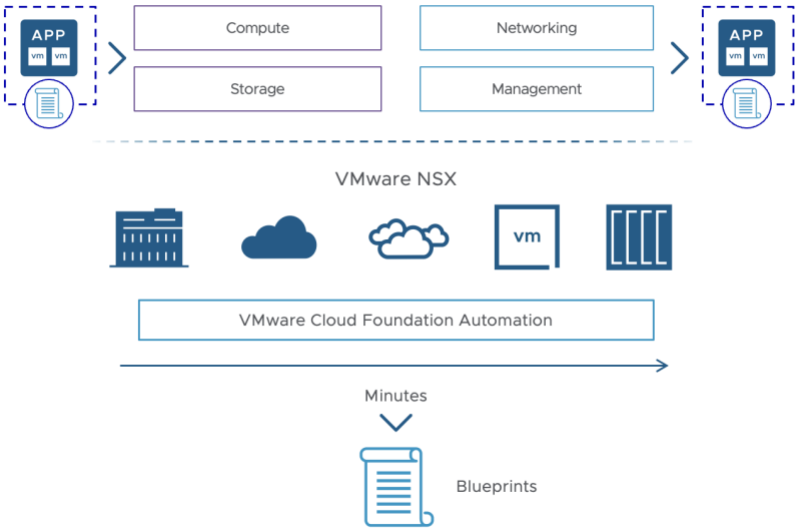

Figure 2: Network Automation with VMware NSX

Extending common network policies across traditional (VM-based) and modern (container-based) apps makes network automation possible. Network automation with VMware NSX delivers immediate value with guided setup, resource discovery and onboarding, resource organization, provisioning, and Day 2 actions.

"Our developers are roughly 20% more productive with VMware NSX because they can do all their provisioning and don't have to wait for infrastructure tickets. We've become more agile with NSX."

VMware NSX user

Enabling application mobility and disaster recovery

VMware NSX allows workloads to be moved seamlessly between racks and data centers by decoupling them from the underlying networks. Using network overlays and a consistent policy framework across different infrastructures, VMware NSX eliminates the need for any changes to the network when moving workloads. This capability supports workload mobility for disaster recovery and workload balancing, ensuring continuous availability and optimal application performance.

This enhanced workload mobility and disaster recovery with VMware NSX allows you to optimize data center performance, agility and utilization without the constraints of complex manual re-routing, traffic engineering, or network policy changes. You can replicate, bulk migrate, and live migrate applications for the fastest possible scaling of resources. Organizations can benefit from the cloud's flexibility and agility while overcoming the network complexity that often limits application mobility.

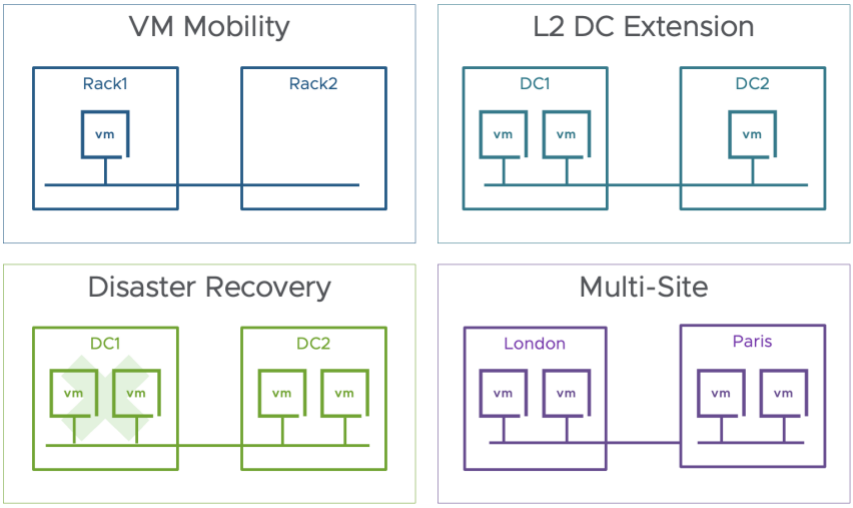

Figure 3: Application Mobility with VMware NSX

Self-Service Networking with VPCs

Virtual Private Cloud (VPC) constructs in VMware NSX enable business units or project teams to provision and manage network resources independently. VPCs provide isolated network environments within a shared infrastructure, allowing for granular control over networking policies and resource allocation.

VMware NSX enables self-service consumption for developers and application teams. Using VPCs and full-stack automation speeds up network provisioning and cuts setup time from months to minutes without tickets or lengthy support processes. The simplified operational model enables you to configure multiple tenants in a single infrastructure with complete data isolation.

This provides the flexibility, speed and scalability of cloud computing without the need for extensive networking expertise.

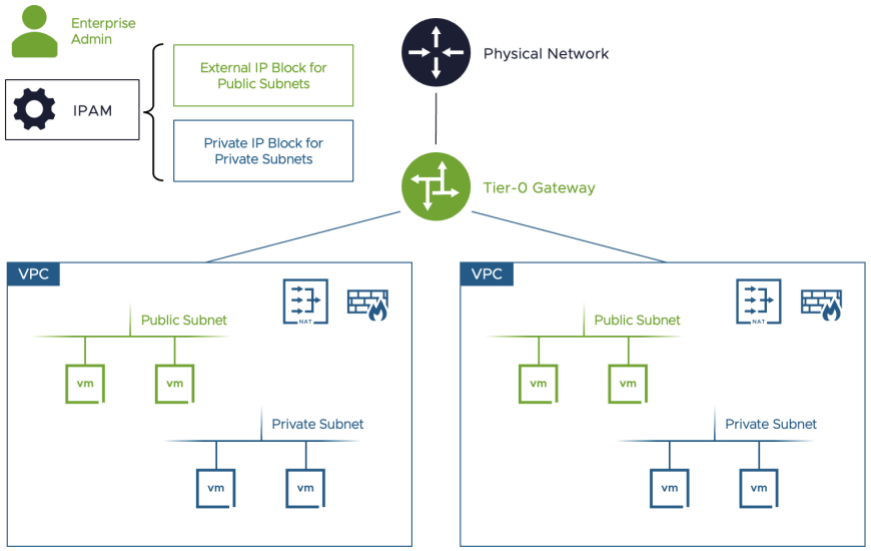

Figure 4: VMware NSX Self-Service Networking with VPCs

Networking for modern applications

Modern applications are heterogeneous and built using VMs, containers, and bare metal servers. They are decoupled from the underlying infrastructure, and delivered as a service to optimize the application experience. VMware NSX and Antrea work together to support modern application architectures, such as microservices and containers, by providing scalable networking services tightly integrated with application development and deployment processes.

Modern applications introduce unique requirements and vulnerabilities. VMware NSX provides networking support for microservices architectures, VMs, and containers equally. This allows workloads to function seamlessly without any concerns about networking complexities. It offers a granular policy per-container basis for new applications as they are developed. VMware Antrea provides centralized management, visibility, and enforcement of security policies for East-West traffic in private clouds. In combination, VMware NSX and Antrea offer a unified networking and security platform for both VMs and containerized applications, facilitating seamless, secure and efficient operations to support the dynamic needs of modern applications.

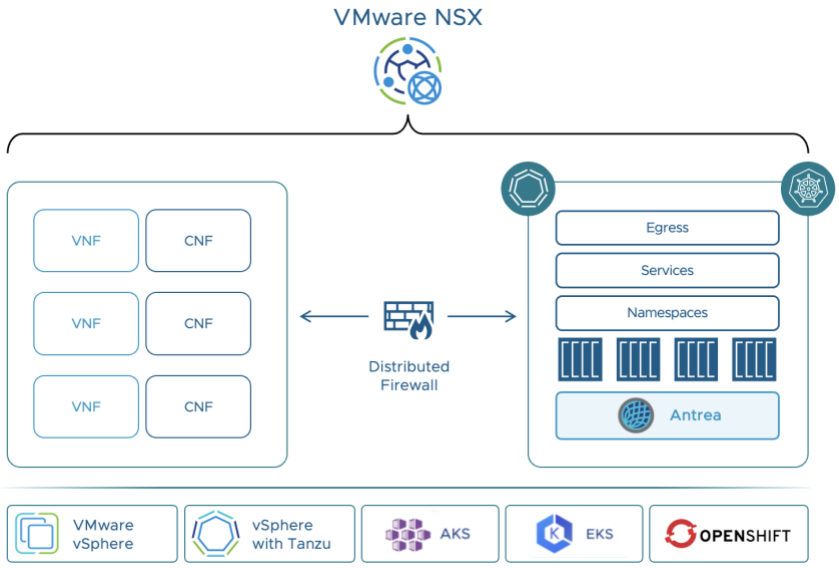

Figure 5: Networking for Modern Applications with VMware NSX

Performant network acceleration

VMware NSX enhances network performance by optimizing network switching and routing, and applying advanced networking techniques such as overlay tunneling and protocol acceleration. It leverages hardware offload capabilities and intelligent traffic steering to improve throughput, reduce latency, and enhance application responsiveness. VMware NSX also provides traffic shaping and Quality of Service (QoS) policies to prioritize critical workloads and ensure predictable performance for latency-sensitive applications. With VMware NSX, organizations can achieve high-performance networking for demanding workloads while maintaining flexibility and scalability.

VMware NSX uses Enhanced Data Path (EDP) to deliver high-performance network services for latency-sensitive applications. EDP optimizes the data path, leveraging technologies like Data Plane Development Kit (DPDK) for accelerated network functions, and seamlessly integrates with critical VMware capabilities such as vMotion and Distributed Resource Scheduler (DRS), and other VMware NSX networking features.

Implementing VMware NSX network services on Data Processing Units (DPUs) connected to application hosts frees up computing resources, enabling high-throughput, low-latency switching and routing. This offloads network tasks to DPUs, simplifying network architecture, reducing operational costs, and improving application performance and network observability.

Learn more

For more information on VMware Cloud Foundation Networking, see the following resources:

VMware NSX page

VMware NSX datasheet

VMware Cloud Foundation Networking page

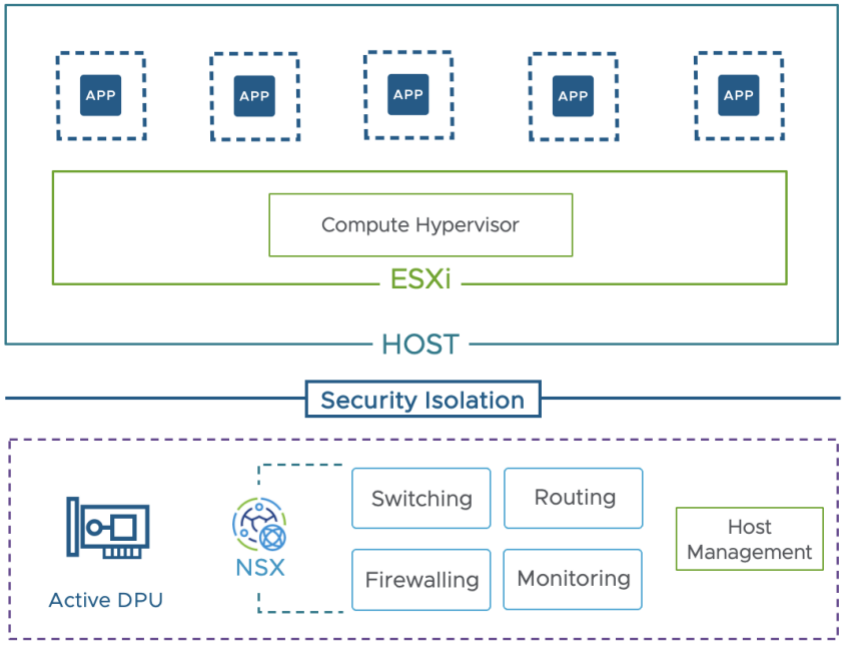

Figure 6: Performant Network Acceleration with VMware NSX

The DPU-based solution also offers advanced network monitoring and analysis without additional hardware and network taps, simplifying troubleshooting and compliance while ensuring reliable network performance at scale.

Accelerate business value today and prepare for the future

Organizations that have deployed VMware NSX quickly realize it's a foundational part of their data center infrastructure and cloud strategy. Today, thousands of IT organizations use VMware NSX to host their most sensitive and critical applications on VMware Cloud Foundation private clouds to accelerate the delivery of value to their businesses.

VMware NSX makes networking and network observability more agile for VCF workloads. It future-proofs investments since it can be deployed on top of any network hardware and topology. This evolution in networking services offered by VMware NSX enables customers to realize substantial and immediate benefits. It also eliminates the time-consuming and challenging tasks that previously consumed a significant portion of their organizational resources. As a result, organizations now have the flexibility to implement enhanced strategies as they prepare for the future and the essential IT functions required to support that vision.

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