

# Revisiting SDN with VergeOS



Organizations are now seeking a VMware Alternative, which is a significant infrastructure change. While IT “has the patient open,” why not take another look at Software-Defined Networking (SDN) to see if it can bring greater flexibility and simplify the operation of the network while further reducing infrastructure costs.

## What is Software-Defined Networking?

SDN, like Software-Defined Storage (SDS) and virtualization, abstracts software from physical hardware. In this case, abstracting the networking software from purpose-built appliances eliminates the need for dedicated firewalls or routers. It makes all the brand-specific capabilities of high-end networking hardware available to commodity-based switches from almost any vendor. Thanks to its ability to provide centralized automation, IT can simultaneously support different brands of network switches and avoid the need for high-end director-class switches.

Initially, most SDN solutions were stand-alone products outside the virtualized infrastructure; they ran on dedicated servers acting as controller nodes. The hypervisor and storage connect with those servers, acting as network controllers. However, the software’s high cost, high complexity, and dedicated hardware requirements limited its adoption. At the same time, virtualization vendors were adding basic network functionality, like virtual switches, to their hypervisors, which customers widely adopted because it was integrated, didn’t require dedicated hardware, and had no additional charge for its use.

The logical next step for hypervisor vendors was to add a complete networking stack to their basic offering in the form of SDN. Today, most SDN solutions are designed to run within a virtual environment.

Like storage and management consoles, hypervisor vendors typically bought or built separate modules and simply plugged them into their management GUI. The virtualized versions of SDN had the exact requirements as the stand-alone versions: dedicated servers (VMs), a hefty additional charge, and a high degree of complexity both in implementation and operation. As a result, these solutions have seen the same limited adoption as the original SDN implementations, only being adopted by the largest of enterprises or organizations with particular networking requirements.

The consequence of this business model is that even though organizations of all sizes could benefit from its use, SDN is out of reach for most IT teams, particularly those managing small to mid-sized data centers. SDN adoption has not come close to meeting initial expectations; most organizations continue to deploy proprietary network switches and align with one vendor for all appliance functionality. When discussing networking, the phrase “We are a Cisco shop” or “We are a Juniper shop” is common in IT services.

# Why Revisit SDN?

As part of IT's VMware-alternative research, they are also reconsidering the software-defined data center (SDDC) or hyperconverged infrastructure (HCI) concepts. These initiatives seem to be a natural fit for SDN since they are already converging storage and virtualization services. Most SDN solutions are designed to run in a virtualized infrastructure. Why not converge storage and networking services? The problem is that most converged storage offerings require compromise, and most converged SDN solutions are vastly overpriced. Most converged infrastructures are comprised of separate modules that share a management GUI. Running SDN as a VM, creates many barriers to adoption, including cost, additional hardware burdens, and increased complexity.

This paper revisits the original vision of SDN, examines why traditional implementations have fallen short, and explores how to integrate SDN into the core infrastructure software.

## Explaining SDN's Low Adoption

### Cost Barriers

The number one reason SDN has seen such low adoption is the high cost of the software itself. SDN is 100% of the time an infrastructure change. IT moves from existing networking hardware to the SDN software and commodity switches. Although the proprietary hardware is more expensive than the hardware the organization will use in the future, it is bought and paid for and comes with software to manage it.

Most SDN add-ons from hypervisor vendors first require an upgrade to an advanced version of the hypervisor and then the addition of the SDN software itself, which is often also sold in a tiered approach based on capabilities. Then, these components are typically priced per core. Once the total cost of adding the correct prerequisite components and SDN tier is reached, the software required for "saving money on hardware" can quickly exceed \$75,000 in software for a small to mid-sized data center. For these organizations, spending \$75,000+ on SDN software so that, in the future, the organization can reduce its hardware costs makes it hard to see how the solution will ever provide an ROI.

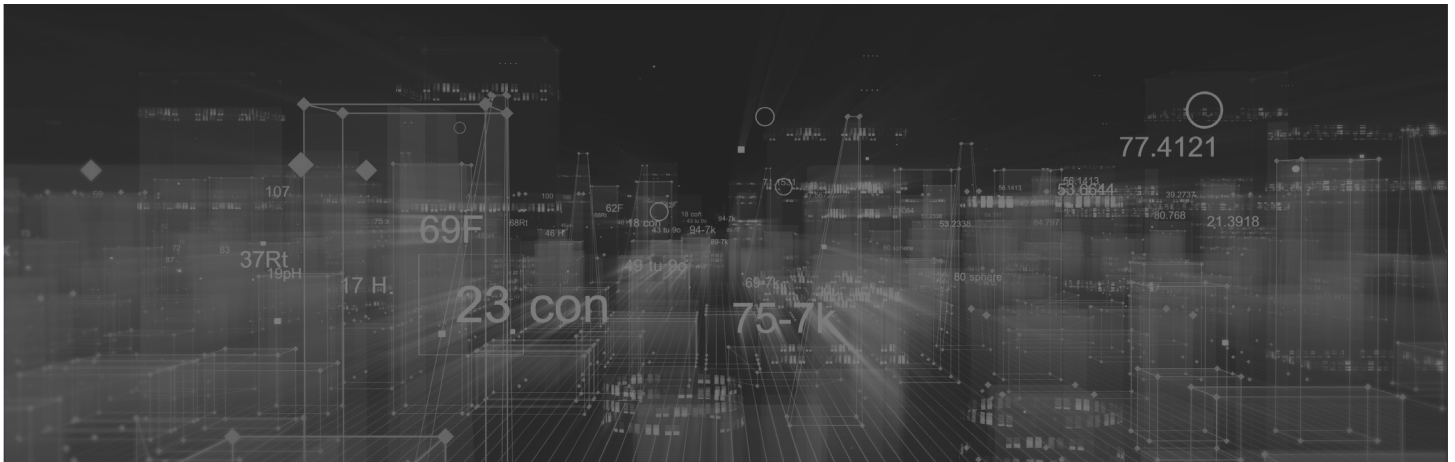
VergeIO has eliminated the cost barriers to SDN adoption by integrating it into VergeOS and providing the VergeFabric service at no additional charge, which includes a full complement of networking capabilities at no extra charge.

### Existing Infrastructure Barriers

While most SDN solutions are now virtualized, they still significantly burden the existing hardware. They require at least three virtual machines (VM) per installation to meet availability requirements. These VMs consume a higher-than-average amount of CPU and memory resources, meaning the servers the SDN VMs run on must be upgraded, or, in most cases, new servers must be purchased. Larger organizations will dedicate servers to running the networking VMs exclusively, making customers face the same challenges the original SDN solutions created.

As mentioned, existing networking services and hardware exist in most data centers, yet most SDN solutions are an all-or-nothing proposition. They can't leave specific capabilities inactive while enabling IT to use others. For example, suppose the customer has a one-year-old firewall appliance that is still under warranty but a router that is out of maintenance. In that case, most SDN solutions will not enable the customer just to activate the router functionality. If they do allow coexistence, the solution's high cost makes it impractical to deploy just for routing. And there is never a moment where all the network hardware simultaneously comes off maintenance.

VergeFabric enables organizations to transition to an SDN architecture incrementally because it is included at no additional cost. As various network appliances reach their CAPEX end of life, those features can begin being utilized within VergeOS, saving significant money over deploying proprietary appliances. Similarly, as network switches reach the end of life, they can be replaced with commodity network switches without loss in capabilities.



## Complexity and Management Challenges

The concept of a separate network controller node VM and potentially dedicated servers to act as the network controller also creates greater complexity. It requires specialized networking expertise, which small to mid-sized IT teams typically don't have access to.

VergeFabric's centralization of network functions means that IT has complete control over its network from a single interface. Gone are the days of logging into multiple consoles to manage the network. The integration of VergeFabric, VergeFS (storage), and VergeHV (virtualization) into VergeOS means that IT can seamlessly move between various infrastructure activities throughout the day. Customers report hours per day being saved because of this management efficiency.

## IT Hesitation

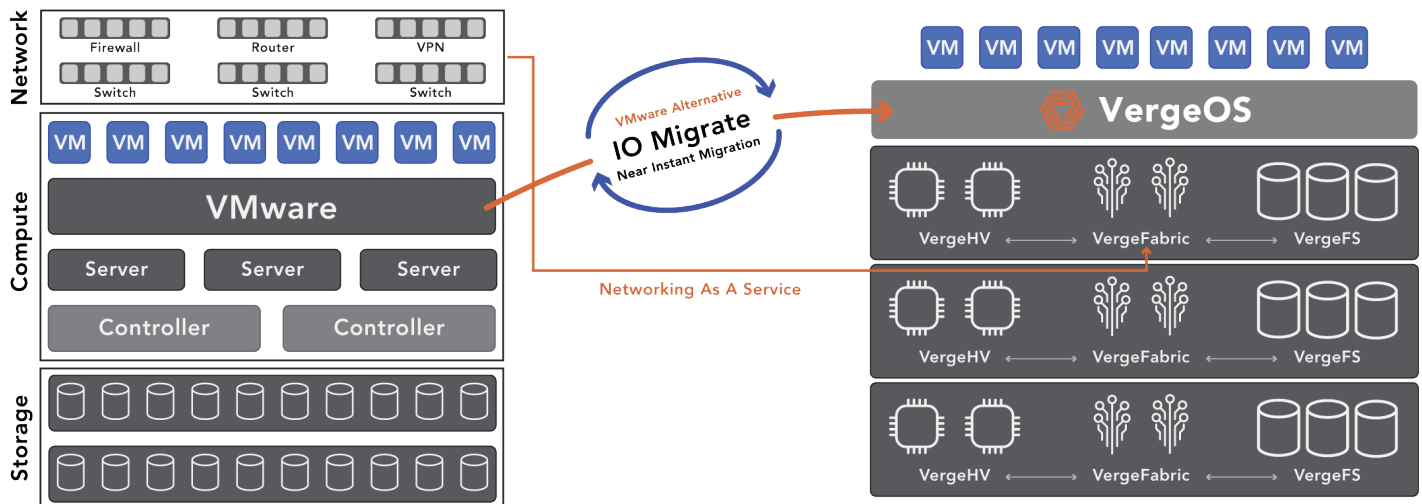
The combination of the challenges described above leads to IT hesitation about transitioning to an SDN-based network architecture. The inability to technically or financially execute an incremental transition to the technology leads to a lengthy time before a return on investment (ROI) can be realized, if ever. Without a clear and quick ROI justification, the concept is not likely to be brought forward to management.

However, because VergeFabric is integrated into VergeOS, ROI can start the first time a purpose-built network appliance is not needed or when a commodity network switch is ordered instead of an expensive proprietary switch.



# The Case for Integrated SDN in VergeOS

Integrating networking, virtualization, and storage into a single data center operating system simplifies installation, lowers resource requirements, and eases day-to-day operation while providing rapid ROI. This approach opens up the capabilities of SDN to data centers of all sizes.



## The Shift Toward Simplifying Infrastructure

Organizations are constantly looking for ways to simplify IT infrastructure. This search is one of the reasons they consider the Public Cloud and is also a reason they look at converged architectures like Hyperconverged Infrastructure (HCI). The problem is that they often rule these infrastructures out. The Public Cloud has become very expensive over time and is becoming increasingly complex. HCI, because the various components (virtualization, storage, networking) of infrastructure still run as separate applications within a VM of the hypervisor, creates compromises in performance and scalability, which these vendors try to overcome by implementing strict hardware compatibility lists (HCL).

VergeIO provides an ultraconverged infrastructure (UCI) solution where virtualization, storage and networking are all integrated into a single data center operating environment. The integration simplifies administration without compromising performance or scalability while also abstracting from hardware to the point that almost any combination of servers can be used within a VergeOS environment.

## Modest Resource Requirements

VergeFabric's integration into VergeOS creates an unprecedented level of efficiency and requires far fewer resources than competing solutions. This integration also means that every server within the instance has full access to its networking capabilities. Customers do not have to designate specific VMs to act as network management controllers or nodes, and concerns about implementing high availability are eliminated; there is always another server able to take over network functions.

## Simplified Installation

VergeFabric's integration into VergeOS makes installation plug-and-play. It is automatically installed; IT just needs to turn on the desired services when needed.

## Minimal Learning Curve

Because services can be implemented as the organization needs them, it is easy to learn VergeFabric, since the administrator can concentrate on any one area as they need to implement it. Also, VergeIO's support team is always ready to help customers work through implementing specific networking functions. Customers can move from networking novices to networking superstars at a comfortable pace.

# What IT Can Achieve with Integrated SDN

## Multi-Tenant Virtual Data Centers

VergeOS's integrated SDN functionality's key benefit is its multi-tenant virtual data center (VDC) technology. VDCs encapsulate an entire data center like a VM encapsulates a physical server. A VDC can contain an entire workload's VM population, its storage setting and specific network settings for that workload. This encapsulation benefits smaller data centers that only need one VDC by simplifying tasks such as patch testing, data protection and disaster recovery. It benefits larger data centers by enabling them to create multiple VDCs, one for each of their primary workloads. They gain the benefits mentioned above plus the benefits of workload isolation, so that a problem in one VDC does not impact other VDCs. IT can also use VDCs to hard allocate specific resources. For example, isolating GPUs to a VDC that is running high-end 3D modeling virtual desktops. Finally, Cloud Service Providers can use them to isolate customers from each other while sharing the same underlying hardware.

## Enhanced Security with VergeFabric: VM-Level Segmentation and VDC-Level Security

VergeOS' integrated SDN, VergeFabric, enables security at both the VM and VDC levels, ensuring workloads, applications, and tenant environments remain isolated without relying on external firewalls or complex VLAN configurations.

At the VM level, VergeFabric enables IT to enforce VM specific segmentation, restricting communication between VMs based on predefined policies. This prevents unauthorized lateral movement within the data center, limiting the spread of threats like ransomware and reducing attack surfaces. Unlike traditional network segmentation, which requires manual VLAN management and firewall rules, VergeFabric simplifies policy enforcement within the hypervisor itself, making security easier to manage without additional hardware.

At the VDC level, VergeFabric extends security beyond individual workloads to provide full tenant isolation. Each VDC functions as an independent, secure environment where network traffic is automatically segmented, preventing unauthorized access between different business units, customers, or departments. This ensures that sensitive workloads remain isolated, protecting against data leakage and simplifying compliance with regulations such as HIPAA, GDPR, and PCI-DSS.

By embedding segmentation directly into the hypervisor, VergeFabric eliminates the need for external firewall appliances and complex network overlays. This integrated approach reduces costs, streamlines security management, and makes enterprise-grade security accessible to organizations of all sizes—from small IT teams managing a handful of VMs to large, multi-tenant infrastructures requiring strict workload isolation. With VergeFabric, data centers gain a powerful, scalable security model without the complexity of traditional networking solutions.



**VergelO's networking capabilities have given us all the essential features of VMware's NSX without the extra cost. NETdepot is taking full advantage of VergelO's Routing and Firewall capabilities to replace external appliances, further reducing costs and simplifying overall operations. We also use advanced networking functions like microsegmentation to enhance security, ensuring greater protection for our infrastructure and our clients.**

Jeff Hinkle, NETdepot

## More Agile Networking with VergeFabric

With an integrated SDN and a single console to manage all infrastructure functions, organizations can rapidly adapt network policies to match workload demands while enhancing security. As workloads scale, IT teams can instantly adjust policies, ensuring seamless connectivity and security enforcement across Virtual Data Centers (VDCs) and Virtual Machines (VMs). Network provisioning becomes automated—when new VDCs or VMs are created, or existing ones are migrated, VergeFabric automatically updates the network configuration without requiring manual intervention.

Unlike traditional SDN solutions that require proprietary hardware, VergeFabric integrates directly with existing network infrastructure, allowing organizations to leverage their current investments while modernizing their approach to networking. IT teams can start with their existing switches and gradually enable VergeFabric features as needed, minimizing disruption and cost. When additional ports or network expansion is required, administrators can incorporate **switches from any vendor**, as VergeFabric overlays and abstracts the underlying network hardware, unifying disparate switches into a cohesive, centrally managed infrastructure.

This flexibility allows organizations to scale their network at their own pace without vendor lock-in, supporting a hybrid model where traditional networking and software-defined capabilities coexist. Whether expanding a data center, integrating new hardware, or enhancing security protocols, VergeFabric ensures that IT teams can **adapt networking strategies without rearchitecting their entire infrastructure**. By simplifying management, reducing hardware dependencies, and enabling seamless expansion, VergeFabric delivers an agile, cost-effective networking solution that evolves with business needs.

## Simplified Disaster Recovery

Disaster recovery is always on the list of priorities for IT to improve. They are looking for ways to improve execution success while controlling, if not even reducing costs. VergeOS allows organizations to achieve these goals. Disaster Recovery is a unique type of recovery because IT seldom needs to recover a single VM and is only concerned about recovering the most recent copy of data. Instead of granular recovery, organizations need “macro-recovery”.

VergeOS’s VDC technology sets the stage for successful DR by encapsulating the entire data center instead of just individual VMs. When organizations replicate at the VDC level they are capturing all the VMs for a given workload as well as any custom network or virtual machine settings and configurations. The complete capture of the environment means IT is replicating a perfectly in sync representation of the data center where all data is perfectly aligned with metadata. SDN makes this capability particularly critical because of its ability to enable dynamic change, and without it, many of these changes would be lost during the recovery effort.

VergeFabric’s inclusion of Border Gateway Protocol (BGP) completes the picture by enabling IT to automate recovery during a disaster, minimizing downtime. BGP works on a priority based setting. Both the primary VDC and the replicated VDC can have the same IP address but the primary VDC’s IP will have a higher priority and BGP will eliminate conflict with the DR site. However, if the primary site is impacted by a disaster their VDCs will be offline. The remote VDC’s IP address will now be the priority and almost instantly resume operations.

## Multi-Site Connectivity

VergeOS and VergeFabric, simplify multi-site connectivity by seamlessly linking distributed data centers, branch offices, and cloud environments into a unified infrastructure. Traditional multi-site networking often requires complex VPN configurations, proprietary WAN solutions, and extensive manual setup to ensure secure, high-performance connectivity between locations.

VergeFabric eliminates these challenges by enabling native, software-defined interconnectivity, allowing VDCs and VMs to move freely across sites without requiring extensive network reconfiguration. With VergeFabric, IT teams can create secure, encrypted connections between multiple sites, ensuring seamless workload mobility, disaster recovery readiness, and real-time data synchronization.

By abstracting the underlying network complexity, VergeFabric overlays disparate network hardware and vendors, enabling organizations to expand or interconnect locations without vendor lock-in or expensive WAN optimizations. This streamlined multi-site architecture reduces operational overhead, enhances resilience, and ensures consistent security policies across all connected environments.

VergeFabric’s ioSite feature, built into the VergeOS GUI provides a single pane of glass overview of the global VergeOS ecosystem. Using the Sites Dashboard, IT can quickly identify sites providing a warning or alert and seamlessly access those sites without having to login a second time.





## Conclusion: VergeFabric is A Cost Effective Alternative to VMware NSX

VMware NSX requires an upgrade to VMware Cloud Foundation, which includes an elementary version of NSX. The more full-featured version, which provides firewall, routing, and advanced segmentation capabilities, is an add-on priced per core. Since Broadcom acquired VMware, customers have been reporting difficulty getting an exact price, and those who do consistently report 200%+ price increases.

VMware's packaging of ESXi (hypervisor), vSAN (software-defined storage), and NSX (SDN) as separate virtual machines has both cost and complexity consequences. The virtual machines that VMware's NSX requires consume significant resources from the virtual environment, including a measurable amount of CPU and memory. A basic NSX environment requires at least three VMs deployed on three different servers (for high availability). This burden may require upgrading or replacing the servers designed to host NSX, so that they have the sufficient processing power and memory to support the additional load, which further increases the cost of implementation and extends the time to realize an ROI.

VergeIO includes VergeFabric written directly into the core of VergeOS. VergeIO licenses are per physical server, not by the number of CPUs or cores. The company encourages customers to build as dense an architecture as possible without concern for out of control infrastructure software licensing costs. The inclusion of VergeFabric into the base license and not charging by CPU or core means customers of all sizes can benefit from its use. Integrating into a single operating environment makes SDN, which was typically a complex subject to learn, now easy to adopt and implement gradually at the organization's chosen pace.