

PowerEdge XE2420 + Two-Node vSAN: Edge-Ready Hyperconverged Architecture

Abstract

This document describes the key components of a hyperconverged solution architecture that is designed explicitly for edge computing. It features the versatile Dell EMC PowerEdge XE2420 server platform, VMware vSAN two-node clustering, Dell EMC Virtual Edge Platform 4600, and VMware SD-WAN™ by VeloCloud®.

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Solution Components

- Dell EMC PowerEdge XE2420 vSAN Ready Node
- Dell EMC Virtual Edge Platform VEP4600
- VMware SD-WAN™ by VeloCloud®

Key Benefits

- Cost reduction
- Server platform designed for edge, including dual-socket, short-depth (400mm class), and front-accessible
- VMware-certified vSAN Ready Node
- Improved performance with accelerator options
- Robust single-pane lifecycle management integrated into VMware vCenter
- Secure and Reliable SD-WAN

Executive summary

Overview

Edge computing plays a key role in transforming our world. Today, organizations want to leverage data originating at the edge—combined with machine learning, analytics, and artificial intelligence—to improve operations, become more agile, and capture next-generation business opportunities. To ensure success, organizations require edge solutions that simplify IT complexity, secure edge infrastructure at scale, and accelerate innovation with a digital edge to cloud architecture.

For organizations to acquire new opportunities and gain a competitive advantage, they must deploy new IT services quickly. However, with limited budget and insufficient resources, the deployment of new IT services has traditionally been time consuming, complex, and cumbersome. This need prompted the desire for a smarter solution that is simple, easy to deploy, and tightly integrated with full validation. Network connectivity across the edges of the data center, branch offices, and cloud ensures that faster deployment of new IT services is efficient, flexible, and resilient.

To meet this need, Dell EMC and VMware developed a combined solution with a hyperconverged platform that includes the following:

- Dell EMC PowerEdge XE2420 vSAN Ready Nodes
- Dell EMC Virtual Edge Platform 4600
- VMware SD-WAN™ by VeloCloud®, a software-defined WAN solution

This solution delivers a cost-efficient, simple, flexible, and easy-to-use architecture that ensures deployment of efficient and faster new IT services.

This white paper defines a validated architecture and helps customers understand how the combined Dell EMC and VMware solution addresses their edge computing needs.

Audience

This white paper is intended for architects, engineers, consultants, and IT administrators who are responsible for designing, implementing, and operating edge infrastructure or hyperconverged platform environments.

Business case

As the center of gravity shifts from centralized data centers to the edge, companies need new compute and network technologies and architectures to deliver edge infrastructure. Data is being generated and processed at the edge more rapidly, and these new requirements and capabilities are becoming critical for business operations. Edge computing helps businesses to process, collect, and transfer data at the edge in real time.

As a result of this shift, not only must distributed platforms be implemented, managed, and correctly maintained, they must also be secured to protect business infrastructure. As an example, massive files and application resources must be quickly transmitted to mobile end users. When the existing wide area network (WAN) cannot support the new requirements of an evolving network, SD-WAN becomes relevant to solve these issues. SD-WAN is ready to support more resource-intensive requirements by becoming the network edge. It absorbs other functions, such as compute, analytics, security, and multicloud, to allow the enterprise to support business where it is conducted—at the edge.

As IT professionals modernize their edge and remote office/branch office (ROBO) infrastructure, they are looking for a preintegrated, validated, and engineered solution. They also want to easily manage, scale, and perform end-to-end life cycle management, with options for secure and reliable connectivity to their edge or branch locations. It should come as no surprise that organizations value efficiencies, ease of use, and a simplified environment. The good news is that VMware and Dell Technologies offer modern solutions to meet these challenges.

Dell EMC PowerEdge vSAN Ready Nodes

Peace of mind

Dell EMC vSAN Ready Nodes are hyperconverged infrastructure (HCI) nodes that encompass validated configurations that VMware has certified as ideal for vSAN deployment. All the legwork to identify the correct components and put them through rigorous vSAN testing together has already been done. Ready Nodes are offered in varied configurations that are designed to meet VMware vSAN specifications, and they are ideal as hyperconverged building blocks in data center environments. This approach simplifies the path to HCI adoption and reduces risks with a validated, tested, and certified solution.

The power of a validated HCI solution built for the edge

Businesses are embracing HCI technologies because of the myriad advantages. Reduce the time, effort, and cost to deploy applications. Easily and securely scale up resources as users and applications are added. Deliver on business initiatives and explore new business opportunities in the data center or at the edge. But traditional server platforms have often been designed primarily for data center use cases. The Dell EMC PowerEdge XE2420 vSAN Ready Node features next-generation technology that is built from the ground-up with edge computing in mind.

Dell EMC PowerEdge XE2420

Addressing the edge

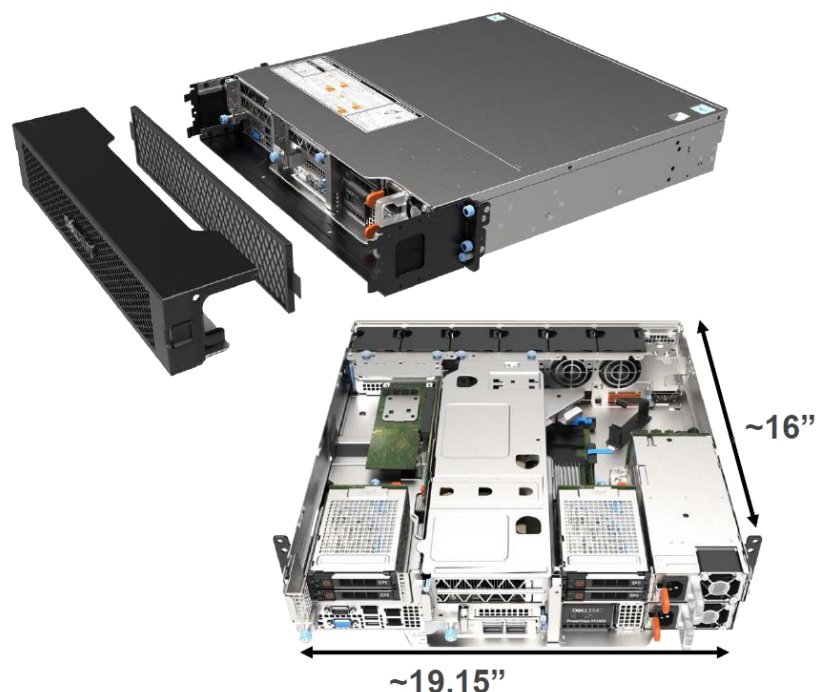


Figure 1. Dell EMC PowerEdge XE2420

The PowerEdge XE2420 is the Dell EMC response to customers who need low latency and high performance as they push the barriers of edge computing. It is a powerful dual-socket, 2U short-depth, front accessible server that is designed to support demanding edge applications such as streaming analytics, manufacturing logistics, and 5G cell processing. Organizations can further boost its performance with the optional support of up to two accelerators (in this vSAN Ready Node configuration, or up to four in alternate configurations).

XE2420 is purpose-built for the edge environment. Short-depth (400 mm class) means it is made to fit compact spaces, including Modular Data Center and 600 mm (19 in.) racks. All its features are front accessible for convenient *cold aisle* service, as shown in Figure 2. Edge environments can be harsh, so XE2420 is designed with this factor in mind. It can really take the heat (and the cold), and it is capable of operating at temperatures from 5°C to 45°C (41°F to 113°F). It even has an optional filter that is built into the bezel to deal with dusty environments.

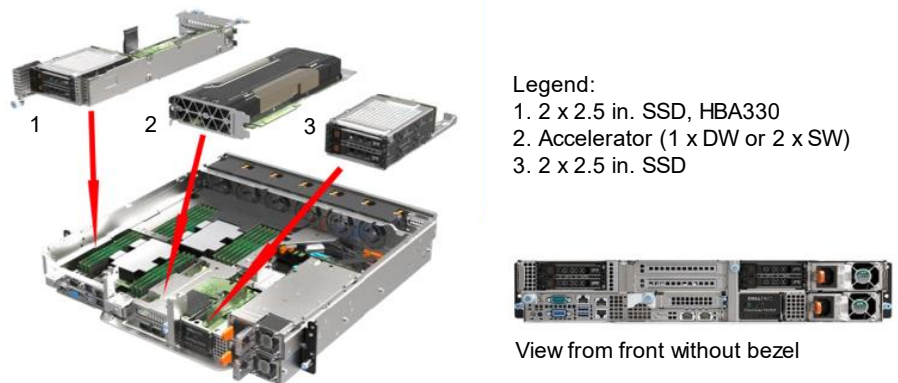


Figure 2. Dell EMC PowerEdge XE2420 vSAN Ready Node components

Secure and simplified management at the edge

Robust life cycle management

Some products billed as *edge* might best be classified as *bleeding edge*, lacking a solid story for ongoing maintenance on day two and beyond. Thankfully, with Dell EMC solutions, companies do not have to settle for manageability gaps. The XE2420, built for edge computing, bears the trusted Dell EMC PowerEdge name and all the mature management capabilities that go with it.

The PowerEdge XE2420 effortlessly manages key server functions with iDRAC9 support, which offers system management features such as operating system deployment, firmware updates, and health monitoring. Also, every PowerEdge server has a cyber-resilient architecture to robustly protect the server and deeply integrate security into every phase of the server life cycle.

With iDRAC9 Datacenter, the PowerEdge XE2420 provides streaming telemetry (GPU monitoring, SMART logs, and idle server detection), with enhanced integrated security for emerging edge applications.

OMIVV - management integrated into the VMware ecosystem

Dell EMC OpenManage Integration for VMware vCenter (OMIVV) streamlines management processes by allowing VMware vCenter Server to manage the

physical and virtual server infrastructure. Single-pane monitoring of PowerEdge hardware in vCenter using host and cluster views and the OMIVV dashboard brings physical and virtual worlds together in one place.

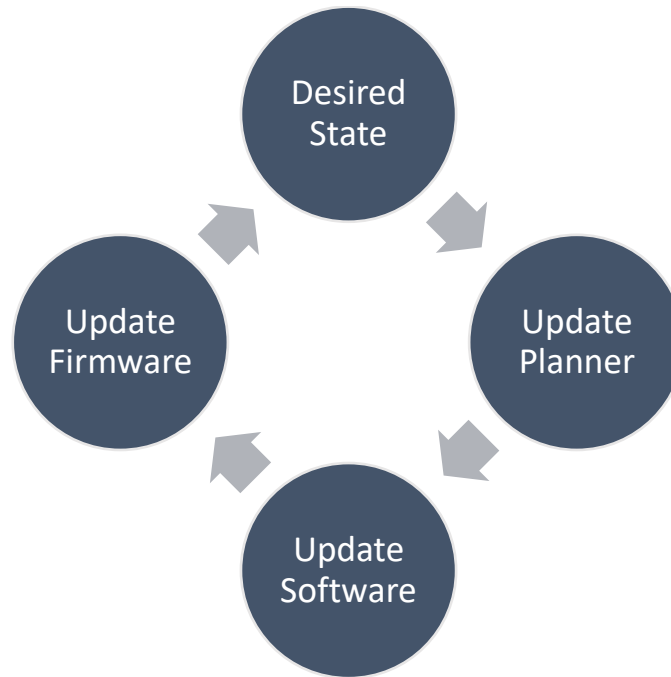


Figure 3. vSphere Lifecycle Manager 7.0 with OpenManage Integration for VMware vCenter 5.2

OMIVV also works with vSphere Lifecycle Manager (vLCM), introduced in vSphere 7.0, enabling customers to manage system firmware levels alongside vLCM with cluster-aware live migration updates. See the preceding Figure 3.

The extended functionality that OMIVV adds to vCenter goes even further. Surface hardware system alerts provide configurable actions in vCenter. Set and audit baselines for server configuration and firmware levels. Speed time-to-value of new PowerEdge servers using discovery, ESXi deployment, and adding to managed vCenters.

NOTE: Automated updates in a two-node cluster environment require special attention when HA Admission Control is enabled. This is by design and will apply universally to any automated updates through vLCM. Please see [VMware KB article 53682](#). Also, as with any web service, network latency of 100ms or less is recommended.

VMware SD-WAN by VeloCloud

VMware SD-WAN is the secure access service edge platform that combines industry-leading SD-WAN capabilities with comprehensive security options for enterprises embracing multicloud architectures and SaaS. The platform provides secure, optimized connectivity for enterprise users at the branch or home. Use it to prioritize mission-critical applications, automate troubleshooting, and administer web and network security. Also simplify operations by merging LAN and WAN management with security into a single, holistic solution.

VMware SD-WAN delivers a cloud-first solution that is flexible to support multiple clouds and SaaS applications strategies. The solution simplifies multicloud interconnect using a centralized management platform that can also communicate over the APIs of multiple Cloud and SaaS providers.

VMware SD-WAN delivers application assurance performance with one of its differentiating features, Dynamic Multipath Optimization. The solution combines

application recognition, traffic prioritization, and shaping with the ability to measure network path performance. This enables steering of traffic on a packet-by-packet basis to achieve the highest-quality experience for end users. The solution also employs artificial intelligence for comparative application performance benchmarking to identify sources and solutions to network issues.

VMware SD-WAN simplifies operations through a cloud-hosted management platform that centralizes network and security policy creation, distribution, and control. The solution visualizes application delivery performance while employing AIOps to suggest remediation actions for LAN, WAN, or data center devices to streamline troubleshooting.

Dell EMC Virtual Edge Platform 4600



Figure 4. Dell EMC Virtual Edge Platform 4600 chassis

The Dell EMC Virtual Edge Platform 4600 (VEP4600) is a Dell EMC networking platform purpose-built for next-generation access deployments. The VEP4600 is a Universal CPE (uCPE) that is ideal for hosting SD-WAN and other virtual network functions like routing, firewall, or deep-packet inspection. It offers hosted virtualized network functionality, with applicability for the service provider edge and enterprise branch.

The Dell EMC VEP4600 solution powered by VMware, including an orchestrator and a global network of gateways, is an important offering for businesses. Customers today are seeking an alternative to the traditional WAN, which has expensive bandwidth, data center dependence and complex infrastructure. Dell Technologies and VMware have transformed the edge, helping customers modernize and evolve their WANs to handle the demanding requirements of a dynamic hybrid cloud world.

The VEP4600 platform offers the following:

- Open and disaggregated networking
- Best-in-class x86-based networking platform
- Virtualized uCPE services such as a bare metal application or on top of a virtualized environment
- Front-facing I/O ports
- QuickAssist Technology on 8-core and 16-core systems
- M.2 SATA SSD high-performance storage
- Out-of-band management using Intelligent Platform Management Interface
- Baseboard management controller
- ESXi hypervisors and native Linux
- KVM support

Bringing it all together – solution design

Overall architecture

This solution brings together the Dell EMC PowerEdge XE2420 vSAN Ready Node, Dell EMC VEP4600, and VMware SD-WAN. This powerful combination enables reliable, high-performance application delivery from the data center to edge or branch offices with minimal remote infrastructure.

This solution consists of a two-node cluster with two directly connected PowerEdge XE2420 vSAN Ready Nodes, and a VMware vSAN Witness Host. In addition, a VMware SD-WAN virtual edge appliance is deployed on Dell EMC VEP4600. The XE2420 cluster is deployed and managed by VMware vCenter Server and OMIVV.

This architecture design provides hardware in the form of two physical PowerEdge XE2420 servers to host VMs and containers. A VEP4600 stores the vSAN Witness appliance. Plus, it has enough resources to place additional virtual appliances such as VMware SD-WAN for a secure tunnel to edge, data center, or cloud. VMware SD-WAN provides enhancements to an edge deployment that is complementary to the native networking provided by service providers. VMware delivers increased network agility and cost reduction by using a software-defined approach to abstract network hardware and by transporting characteristics from the applications that are using the data center and edge network.

This solution provides resources to enable a mini-SDDC for several use cases, including the following but not limited to:

- Retail
- Virtual desktop infrastructure
- Artificial intelligence/machine learning
- 5G/Telco
- Manufacturing logistics
- Streaming analytics

Figure 5. Deployment architecture options shows the deployment architecture options for a two-node XE2420 infrastructure at the edge, with VMware SD-WAN and Dell EMC VEP4600.

vSAN Witness and VMware SD-WAN Virtual Edge on VEP 4600

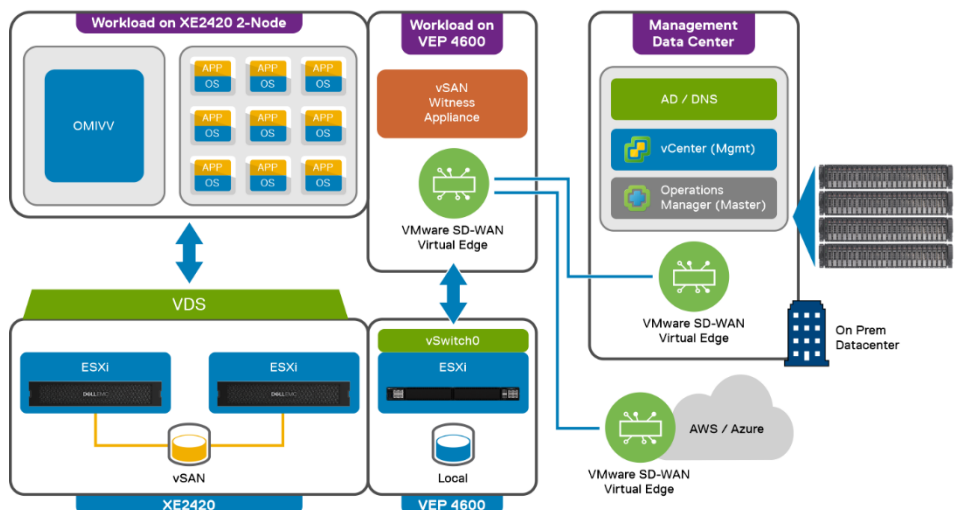


Figure 5. Deployment architecture options

- In this deployment, the central data center is hosting all management components including Active Directory, DNS, VMware vCenter Server, and VMware vRealize Operations Manager.
- A two-node XE2420 cluster is connected back-to-back with 10 GbE for vSAN and vMotion traffic, hosted at an edge location.
- The central data center and XE2420 cluster are connected using an L3 routed network. However, a L2 network is fully supported with this solution. VMware SD-WAN is used to connect both a central data center and edge location.
- The vSAN witness appliance and VMware virtual edge appliance are hosted on a VEP4600 and connected with an L3 routed network for this solution. However, if a witness appliance has network connectivity and can reach the XE2420 cluster, it can be hosted in a central data center or cloud. The purpose of putting a witness appliance on VEP4600 is to ensure that customer edge infrastructure is self-sufficient where network connectivity and bandwidth are scarce.
- VEP4600 acts as a third ESXi host and is managed by a vCenter that is hosted in a central data center. This host does not need a cache or capacity drive for vSAN. It uses the local disks to store the vSAN witness appliance and VMware SD-WAN virtual edge appliance.
- Workload VMs are hosted on a two-node XE2420 cluster and managed by a vCenter that is hosted in a central data center.

Network design

Figure 6. Network connectivity shows the network connectivity of the Dell EMC two-node PowerEdge XE2420 cluster and VEP4600 with VMware SD-WAN.

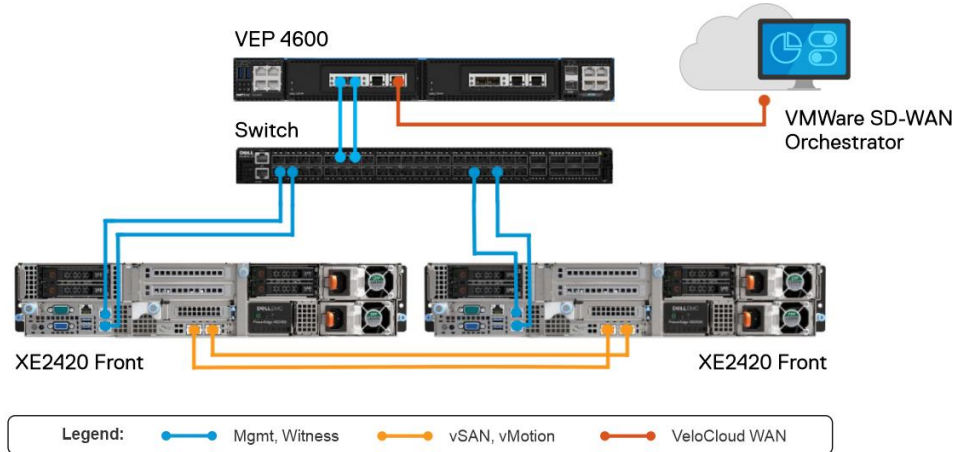


Figure 6. Network connectivity

In this solution design, the two vSAN data nodes are directly connected using a network crossover cable, or SFP+ cables. The following networks are in place as well.

- A 1 GbE or 10 GbE physical network switch is required.
- 1 GbE LOM Ports of the PowerEdge XE2420 Ready Nodes are connected to the switch. These are used for management and witness traffic. If connected to a 1GbE switch, port speed autonegotiates down to 1GbE.

- 10 GbE (or 25 GbE) OCP Mezzanine ports 1 and 2 from Node A are directly connected to Ports 1 and 2 of Node B respectively. These ports are used for vSAN and VMware vSphere vMotion traffic.

For VMware vSAN Witness, the Witness VLAN and VM port groups are configured on the two-node XE2420 cluster.

Technical specifications

Hardware

Item Description	Quantity
Dell EMC PowerEdge XE2420 vSAN Ready Node <ul style="list-style-type: none"> • Intel® Xeon® Gold 6252, 2.3 GHz, 24 Cores, 2 Sockets • 384 GB RAM • 3.84 TB Capacity SSD • 400 GB Cache SSD 	2
VEP4600 <ul style="list-style-type: none"> • D-2146NT CPU: 8C, QAT@40G, 80W • 32 GB RAM • 960 GB SSD • 2 x 10 GbE, SFP+ • 4 x 1 GbE 	1
Dell EMC PowerSwitch S3148-ON	1

NOTE: Any managed 1 GbE or 10 GbE network switch can be used.

Software

Component	Version	Build
ESXi	7.0.0	15843807
vCenter	7.0.0	15952498
vSAN Witness Appliance	7.0.0	15843807
VMware SD-WAN Virtual Edge	3.3.2	N/A

Resources

To learn more about the components of this solution, please see the following resources.

[PowerEdge XE2420 vLCM & OMIVV – Firmware Update of a vSAN cluster at the Edge: Demo](#)

[PowerEdge XE2420 on VMware vSAN Ready Node VCG](#)

[Dell EMC vSAN Ready Nodes](#)

[Dell EMC PowerEdge XE Series](#)

[Dell EMC OpenManage Integration for VMware vCenter \(OMIVV\)](#)

[VMware SD-WAN for Hyperconverged Platform](#)

[VMware vSAN 2-Node Guide](#)

[KB: Using Update Manager in a 2-node Cluster](#)

[HA Settings for 2-node vSAN Clusters](#)

Conclusion

This white paper describes a minimal configuration of a two-node Dell EMC PowerEdge XE2420 vSAN Ready Node and VEP4600 architecture. It includes deployment in a remote edge location and an option for secure and reliable connectivity to edge or ROBO locations using VMware SD-WAN. This solution provides a consistent experience, starting from automated life cycle management and ease of deployment to ongoing maintenance. It enables efficient centralized management with reduced hardware and software costs, while meeting the needs of environments with limited space, budget, and IT personnel constraints.