HCI Powered by VMware vSAN

April 2017
Digital Businesses Face Economic Stress

Digital Transformation

Budget Constraints

Fast Pace of Technology
Every Business Initiative Today is an IT Project

Modern infrastructure must…

◆ Allow shifting resources
◆ Deliver agility to meet unpredictable needs
◆ Be scalable and future ready
Modernization of the Data Center Being Fueled by HCI

- Lower total costs
- Greater agility and scale
- Simplified management

Traditional 3-Tiered Architecture
Complex and Separate Silos

- Virtualization
- Servers and Blades
- External Storage
- Networking Hardware

Hyper-Converged Infrastructure

- Unified Management
- Virtualization
  - Compute | Storage | Network
- Server + Storage
- Network
- Built on Industry-Standard Servers and Switches
HCI is the Fastest Growing Storage Segment

Switch to efficient, server economics

Extend simple server management to storage

Unlock affordable server-side flash

300,000 on-board sensors send log files to a Big Data Analytics System running on VMware vSAN.

Analytics accelerate maintenance and turnaround times.

Each extra hour of flying time yields $25,000 in savings.
VMware and HCI
Enabling industry-leading HCI solutions for the evolving IT industry
HCI Powered by VMware vSAN

- vSphere®: Industry-Standard Hypervisor
- vSAN™: Native Storage
- vCenter®: Unified Management

Brodest Deployment Choices

- vSAN ReadyNodes
- Turnkey Appliances
- VMware Cloud Foundation™
- VMware vCloud® Air™ Network
Why HCI Powered by vSAN?

Evolve without Risk
- Extend don’t replace
- Native security

Lower TCO
- Lower Capex
- Reduce Opex

Scale to Tomorrow
- Deploy new HW, Apps
- Built for multi-cloud
Blistering Pace of vSAN Adoption

Fastest since ESX

7,000 Customers

150% YoY bookings growth

$300M Software run-rate

100% Industry verticals use vSAN

Recent industry awards
HCI Powered by VMware vSAN

- Runs on any standard x86 server
- Pools SSDs/HDDs into a shared datastore
- Delivers enterprise-grade security, scale and performance
- Managed through per-VM storage policies
- Deeply integrated with the VMware stack
Accelerating HCI Innovation

H1 2016
- Compression
- Deduplication
- Erasure Coding
- Quality of Service

H2 2016
- AWS Announcement
- Container Support
- Cloud Native Apps

Native Security
Always-On Protection
Enhanced Stretched Clusters
Cloud Analytics
Intelligent Operations
Higher Performance
Modern Infrastructure for Modern Workloads

- Business-Critical Apps
- Virtual Desktops (VDI)
- Databases (SQL/Oracle)
- Cloud-Native Apps
- DR / DA
- Containers
- Management Clusters
- ROBO

vSAN
vSAN Target Markets

What use cases are you using vSAN for today?
(Total Responses = 249)

- Test and Development: 49%
- Management Infrastructure: 40%
- Disaster Recovery Infrastructure: 23%
- Virtual Desktop Infrastructure (VDI): 22%
- Remote Office/Branch Office (ROBO): 18%
- Other: 3%


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EVOLVE WITHOUT RISK

Use VMware-native storage

Native HCI security

Protect storage investments
You are Already Just a Step Away from HCI
Build on the virtualization foundation and expertise you already have

Traditional vSphere Infrastructure

- VMware SDDC Solutions
- 3rd Party Ecosystem
- vSphere
- Managed by vCenter
- Storage
- Networking
- Servers

Hyper-Converged Infrastructure

- VMware SDDC Solutions
- 3rd Party Ecosystem
- vSphere
- vSAN
- Managed by vCenter
- Optional

No risk of new solution ecosystem
No risk of new software installation
No risk of new management tool
No risk of new server vendor
Deploy Confidently with Proven Data Center Solutions

Native vSphere Experience
- vMotion®
- Storage vMotion®
- Policy-Based Management
- Fault Tolerance
- vSphere® Replication™
- Data Protection
- Snapshots
- HA
- DRS™

End-to-End Solutions
- NSX®
- vRealize® Ops™
- Horizon®
- vRealize® Automation™
- vCenter
- vRealize® Log Insight™
- vCloud® Air™
- Site Recovery Manager™
- VMware Cloud Foundation

Extend with Software Ecosystem
- vRealize® Automation™
- vRealize® Log Insight™
- VMware Cloud Foundation

5x Larger Hardware Choice
- HCI Powered by VMware vSAN
- Symantec
- rubrik
- COHERSITY
- HYTRUST
- TREND MICRO
- SAP
- CITRIX
- redhat
- Microsoft
- ORACLE
- Epic
- VMware
- FISHERA
- DELL
- ERICSSON
- HPE
- Hitachi
- Hitachi Data Systems
- Fujitsu
- Hitachi
- Lenovo
- HUAWEI
- inspur
- NEC

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Control HCI Deployments with Choice of DIY or Appliances

Dell EMC VxRail Appliances

All-in-one HCI Appliance
- Dell EMC best-in-breed data protection
- Rapid time-to-value with multiple configurations
- Single, pro-active vendor support for software and hardware

VMware vSAN ReadyNodes

Fully Customizable HCI
- Choice of 5x more server vendors
- Software and support flexibility
- Backup agnostic to minimize change
Simplify Security and Compliance Needs with Native HCI Encryption

- Simple per-cluster encryption
- Secure with leading KMIP compliant key managers
- Built for compliance
- Deploy on all-flash or hybrid systems
- Hardware independence provides choice
- Use with storage efficiency features

Meet key compliance and security requirements

Protect against unwanted access or drive theft

Flexibility to deploy on flash hardware of choice, including existing drives

Lower cost by eliminating need for costly self-encrypting drives

Simplified management with a single cluster-wide key to manage and change
Continue to Use Existing Storage Investments with Common Policy Management Framework

Protect storage investments by complementing vSAN storage with SAN or NAS storage

Automated VM-level placement and provisioning on both vSAN and traditional storage

Single-click policy changes to control data services, like QoS, at the VM or VMDK level
LOWER TCO

- Benefit from Server Economics
- Increase Operational Efficiency
- Accelerate Responsiveness
Customers Primarily Choose vSAN For TCO Benefits

~50% of customers choose vSAN to lower TCO and simplify management

Performance must be at least as good

- Lower TCO: 25%
- Simpler management: 15%
- Eliminate storage array maintenance renewals: 5%
- Reduce admin workload: 4%
- Adopt a scale-out architecture: 17%
- Other: 15%
- Avoid a SAN upgrade: 11%
- Better performance: 7%
Reduce Capex with Server-Side Economics

Traditional Storage

Enterprise Disks (HDDs) $1.25/GB*

Flash (SSDs) $6.30/GB*

Networking $1356/Port

Pay less for server-side components

Consolidate onto a smaller footprint

Lower Capex and Opex

Eliminate fiber-channel networking

Source: $/GB refers to disk prices raw GB only and is based on publicly available list prices as of Nov 2016
Greater Consolidation Ratio Lowers Cost per VM

Typical HCI

- Storage VM consumes resources
- Data paths are inefficient
- Additional management bolted on

vSphere-Native vSAN

- 2x CPU and 3x memory efficiency
- Native vMotion and DRS
- Simple, single-management pane
Scales On-Demand: Predictably and Cost-Effectively

Traditional SAN
- Large upfront purchase
- Storage only costs
- Complex planning
- High initial cost
- Scale with full system

HCI Powered by vSAN
- Small upfront costs
- Includes storage and compute
- Predictable outcome
- Initial cost lower
- Scale with single node
Site Protection for 50% Less than Traditional Solutions with Enhanced Stretched Clusters

Greater availability with local and site protection

50% lower costs compared to leading legacy storage solutions

Simplified operations with policy-based management for non-disruptive changes

Increased flexibility with granular per-VM policies and 1-click witness replacement
Lower Opex by 50% or More
IDC study of vSAN users

Q: When thinking of the tasks that will be conducted more efficiently, what improvement in IT staff time did you see versus previous environments?

Up to 59% Less Time for Storage Tasks
Reduce Management Silos with One Tool, One Team

Built-in health, capacity, and performance monitoring

Environment with Traditional Enterprise SAN

Hyper-Converged Infrastructure

- Configuration
- Health checks
- Performance monitoring
- Capacity reporting

Admin time

1 tool, 1 team

50%
Lower Operational Costs Up to 80% with Intelligent Operations

- **vSAN Easy Install with 1-click fixes**
- **1-click controller hardware lifecycle management**
- **Comprehensive monitoring with enhanced Health services**

Accelerate deployments with configuration checks and 1-click fixes
Reduce time up to 80%* on hardware lifecycle management
Simplify monitoring with more comprehensive vSAN Health Services

* Source: VMware Internal Analysis. Comparison against vSAN 6.5 upgrade time.
Accelerate Day-to-Day Tasks with Policy-Based Automation

Simplicity of per-VM storage policies for capacity, performance, availability

No LUN/Volumes – automated control of service levels

Scalable automation platform with PowerCLI

Non-disruptive policy changes
All-Flash vSAN Reduces TCO by Over 50% vs. All-Flash Arrays

Eliminate expensive custom hardware and save 58% over a five-year period

20TB
All-Flash Array

Opex

Support

Hardware

$738K

20TB
All-Flash vSAN

Opex

Support

Software

Hardware

$309K

58%

Lower Cost than All-Flash Arrays
Lower TCO by 50% or More
Real-world examples

100% Eliminated
50% Less
80% Less

Day-to-day storage management in field sites and simplified central operations with one team, one SKU
Spent on equivalent storage by using vSAN to replace our traditional SAN architecture
Server-centric economics HCI solution powered by vSAN versus traditional storage alternatives
SCALE TO TOMORROW

Grow into Next-Gen Hardware

Prepare for Any Workload

Build for the Multi-Cloud Era
Ready for Any Workload with up to 50% More All-Flash Performance

Accelerate mission-critical applications with enhanced all-flash performance

Expedite infrastructure modernization projects with confidence

Simplify environment with strong mixed-workload performance

50%
Greater All-Flash Performance with vSAN 6.6

1 Source: VMware Internal Analysis of All-Flash with all data services on. Compared to vSAN 6.5

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Today
Low latency devices too expensive for persistent storage
Device latency >> Network latency

Future
SSD is the new capacity disk
High-capacity NVMe
Byte-addressable NVDIMMs
Network latency >> Device latency
Expand competitive advantage with Day 1 support of latest flash innovations
Simplify new technology adoption without a major forklift upgrade to infrastructure
Lower costs with higher consolidation ratios

Support larger caching drive options, including 1.6TB flash drives
Day 1 support of latest hardware through industry’s best ecosystem
Lower read latencies with vSAN and new 3D XPoint NVMe drives from Intel
Simplify Adoption of Next-Gen Apps

Docker Volume Driver 1.1
- Multi-Tenancy
- Policy Support
- Cloning
- Snapshots

Photon Platform 1.1 with vSAN
- Platform Services
- Photon Controller
- ESXi | NSX | vSAN

Next-Generation Applications

Accelerate DevOps support with native vSAN services in Photon Platform
Streamline infrastructure with one platform across any application
Accelerate next-gen apps with optimized flash performance
Deploy with confidence using proven reference architecture
The Modern Data Center is a Unified Software-Defined Platform Extensible to the Public Cloud

Private Cloud

- Management and Automation
- Compute
- Storage
- Network

Unified Software-Defined Platform

Powered by vSAN and Virtual Volumes

Public Cloud

- VMware vCloud Air
- VMware vCloud Air Network

Software defined

- Enterprise ready
- Elastically scalable
- Extensible to public cloud
- Ready for traditional and cloud native apps
- Automated
VMware Cloud Foundation: Unified SDDC Solution for Multi-Cloud Era

Next-Gen Hyper-Converged
Unified, natively integrated cloud infrastructure stack

Simple Operations
Automates deployment and lifecycle management with SDDC Manager

Multi-Cloud Era
Available across private and public cloud environments
Conclusion
Evolve without the Risk, Costs or Limitations of Traditional Infrastructure

- Evolve without Risk
- Lower TCO
- Scale to Tomorrow
## Industry’s Most Complete Solution for Modern Data Centers

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Cloud</td>
<td>Experience unified operating environment from on-prem to choice of public clouds</td>
</tr>
<tr>
<td>SDDC ecosystem</td>
<td>Full SDDC offering with broad ecosystem of hardware platforms and complementary software</td>
</tr>
<tr>
<td>Native security</td>
<td>Industry’s first native HCI security solution for data-at-rest encryption.</td>
</tr>
<tr>
<td>Simplified management</td>
<td>Policy-based management to automate common tasks and reduce operational risk</td>
</tr>
<tr>
<td>Reduce TCO</td>
<td>Higher performance for any application</td>
</tr>
</tbody>
</table>
Next Steps to Get Started with vSAN

Start with vSAN Assessment

- Understand the needs of your environment in just one week!
- Contact your VMware Partner, SEs or Rep for a free vSAN assessment

StorageHub – Demos and Guides
www.storagehub.vmware.com

Free Hands-On Labs
vmware.com/go/vsanlab

Virtual Blocks – vSAN Blog
blogs.vmware.com/virtualblocks/

vSAN Sales Experts
sdssales@vmware.com
Thank You

@vmwarevsan
What’s New: vSAN 6.6 Pricing and Packaging Updates

VMware HCI Kit Bundles

- Four new HCI bundles with vSphere and vSAN licensing
- Simplified building block for vSAN ReadyNode deployments
- Flexible offerings for data center and ROBO environments

Pricing and Packaging Updates

- New data-at rest encryption available in vSAN Enterprise (ENT)
- Enhanced Stretch Clusters with local site protection in ENT
- QoS cascaded to all vSAN editions (STD, ADV and ENT)
Simplify HCI Sales with New vSAN-vSphere Soft Bundles

- **VMware HCI Kit ADV**
  - vSphere Ent+
  - vSAN ADV

- **VMware HCI Kit ENT**
  - vSOM ENT+
  - vSAN ENT

- **VMware HCI Kit ROBO STD**
  - vSphere ROBO STD
  - vSAN ROBO STD

- **VMware HCI Kit ROBO ADV**
  - vSphere ROBO ADV
  - vSAN ROBO ADV

**Data Center Kits**

**ROBO Kits**
# vSAN 6.6 Pricing and Packaging Summary

<table>
<thead>
<tr>
<th>Features</th>
<th>vSAN STD</th>
<th>vSAN ADV</th>
<th>vSAN ENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Policy-Based Management</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Read / Write SSD Caching</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Distributed RAID</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>vSphere Distributed Switch</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>vSAN Snapshots &amp; Clones</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Rack Awareness</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Replication (5 min RPO)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>All-Flash Support</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Block Access (iSCSI)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>QoS – IOPS Limits</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Deduplication &amp; Compression (All Flash only)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Erasure Coding (All Flash only)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Stretched Cluster with Local Failure Protection</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Data-at-rest Encryption</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
Appendix B: vSAN 1-Slide Summaries
Hyper-Converged Infrastructure
Powered by vSAN

Expand with proven solutions

Best vSphere and vCenter integration

Choose preferred server platform

Ready for any app, container or cloud

Manage with one tool, one team

Lower Capex and shift to all-flash with server economics

Flexibility to deploy latest hardware

Evolve without Risk
Seamlessly shift to HCI with minimal changes

Lower TCO
Reduce Capex and Opex by 50% or more

Scale to Tomorrow
Ready for new hardware, apps and cloud solutions

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Three vSAN Advantages Fueling the HCI Growth

- **Evolve without Risk**: Seamlessly shift to HCI with minimal changes
- **Lower TCO**: Reduce Capex and Opex by 50% or more
- **Scale to Tomorrow**: Ready for new hardware, apps and cloud solutions
Appendix C: Misc Feature Slides
Slash All-Flash Storage Costs with Space Efficiency Features

Space Efficiency features work together to provide up to 10x reduction in dataset size

Inline Deduplication and Compression

- Software-based
- Minimal (<5%) CPU and memory resource impact maintains high VM performance
- Optimal efficiency: highly granular 4K block size
- Continuous benefits as data grows, more VMs added

7x

Up to 7x storage reduction with deduplication and compression

Erasure Coding (RAID 5/6)

- Predictable 50% to 100% increase in effective storage capacity while maintaining the same protection levels
- Independent of workload and dataset
- Single parity protection or double parity protection (failures to tolerate equal 1 or 2)

100% OR 50%

Increase in usable storage capacity for FTT=2
Increase in usable storage capacity for FTT=1

* Actual deduplication and compression storage reduction will vary based on workload and configuration.
## Rapid Pace of Innovation: vSAN 6.6 Biggest Release Ever!

### 20+ New Major vSAN Features

<table>
<thead>
<tr>
<th>Version</th>
<th>Released</th>
<th>Features</th>
</tr>
</thead>
</table>
| v5.5    | 3/2014   | • Distributed RAID  
• Per-VM SPBM  
• Set and change FTT via policy  
• In-kernel hyper-convergence engine  
• RVC and Observer |
| v6.0    | 3/2015   | • All-flash architecture  
• Perf improvements (4x IOPS)  
• 64-node support  
• High density storage blades  
• Fault domain awareness  
• Scalable snapshots and clones  
• Disk enclosure management |
| v6.1    | 8/2015   | • Windows Failover Clustering  
• Oracle RAC support  
• HW checksum and encryption  
• 2-node ROBO mode  
• UltraDIMM and NVMe support  
• Stretch clusters  
• 5 min RPO (vSphere Rep)  
• SMP-FT support  
• Health Check, vROps, LogInsight |
| v6.2    | 2/2016   | • IPv6 support  
• Software checksum  
• Nearline dedup and compression on all-flash  
• Erasure coding on all-flash  
• QoS: IOPS limits  
• Performance monitoring service |
| v6.5    | 2/2016   | • iSCSI  
• 2-Node direct connect  
• PowerCLI  
• Public APIs and SDK  
• 512e support  
• All-Flash to all editions |
| v6.6    | 4/2017   | • Native encryption for data-at-rest  
• Compliance certifications  
• Resilient management independent of vCenter  
• Degraded Disk Handling v2.0 (DDHv2)  
• Smart repairs and enhanced rebalancing  
• Intelligent rebuilds using partial repairs  
• Certified file service & data protection solutions  
• Stretched clusters with local failure protection  
• Site affinity for stretched clusters  
• 1-click witness change for Stretched Cluster  
• vSAN Management Pack for vRealize  
• Enhanced vSAN SDK and PowerCLI  
• Simple networking with Unicast  
• vSAN Cloud Analytics with real-time support notification and recommendations  
• vSAN Config Assist with 1-click hardware lifecycle management  
• Extended vSAN Health Services  
• vSAN Easy Install with 1-click fixes  
• Up to 50% greater IOPS for all-flash with optimized checksum and dedupe  
• Support for new next-gen workloads  
• vSAN for Photon in Photon Platform 1.1  
• Day 0 support for latest flash technologies  
• Expanded caching tier choice  
• Docker Volume Driver 1.1  
(vSphere 6.5 EP02 Patch) |
Reduce TCO with iSCSI Support

- Eliminate cost and complexity of separate physical array
- Deliver vSAN benefits to physical, non-virtualized workloads
- Enjoy core vSAN features and policy management in vCenter
Lower ROBO Costs and Complexity with 2-Node Direct Connect

- Save up to 20%* per ROBO – eliminate standard switches between 2-nodes
- Reduced network complexity with reliable, low-cost crossover cables
- Better compliance with separate vSAN data traffic and witness VM traffic

Savings:

2 Node ROBO avg cost: $11-12K USD
2 10G switch cost: $2-$3K USD
Total cost savings with cross connect cable approximately 15-20%

* Source: VMware Internal Analysis based on stated pricing.
Extend vSAN to Containers and CNA

vCenter Server

Photon Controller

Persistent Docker Volume Driver

vSphere Integrated Containers
Docker API Compatibility

Persistent Volume Driver

VM-like container isolation

Photon Platform
vSAN proven storage services available with Photon

100% API managed vSAN

Designed for DevOps
Extensible with Certified File Services and Data Protection Solutions

Data Protection

Flexibility to extend HCI environment with additional software services

Greater confidence when deploying 3rd party solutions of choice

File Services

Simplified experience with vSAN documentation, best practices, and support
Accelerate Deployments with Enhanced vSAN Assessment Tool

Confidently identify VMs to deploy on vSAN with the newly enhanced vSAN Assessment Tool

Streamline buying decisions with custom sizing and hardware recommendations

Estimate storage CAPEX and OPEX savings

Updates include rebootless installation, 2-day reporting and granular dashboards

Contact vSAN partner or sales to get started today
Broader Choice of HCI Deployment Options

Certified Platforms
vSAN ReadyNodes

Turnkey HCI Appliances
Dell EMC VxRail

Unified SDDC Platform
VMware Cloud Foundation

SDDC Building Block

Full SDDC
VMware vSAN Deploy Service

For customers who want to respond faster to dynamic demands, reduce TCO, and prepare for tomorrow’s IT needs in the cross-cloud era

This Service Helps You
Deploy a fast, highly resilient, easy-to-manage shared datastore solution that supports a wide variety of workloads at a fraction of the cost of traditional, purpose-built storage and hyper-converged infrastructures

Primary Deliverable
A base deployment of VMware vSAN and the underlying supporting virtual infrastructure, using the capabilities provided by VMware vSphere

Engagement Time
One week

Cost
Price: $20,400 USD
SKU: CON-VSAN-DPY
Next Steps to Learn How VMware vSAN Can Help Your Organization

1. Virtual Blocks Blog
2. Hands-On Lab
3. Free vSAN Assessment
Appendix D: Customer Case Study
vSAN Accelerates Patient Care
Utilizing vSAN resulted in massive efficiencies, higher-performance and simpler scalability

- Faster report completion and super fast app and database response times
- Latency is ~ 200x lower than previous system
- Budget-friendly scaling enabled new projects on vSAN with over 50% cost savings

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Global Direct-Selling Giant Chooses vSAN for Tier-1 Apps: Databases to VDI

Mix of All-Flash and Hybrid use cases on vSAN

- 80% Greater cost savings versus traditional systems
- 20x Performance improvement reduces launch times from 20min to <1min
- Simple Simpler daily management shifts IT focus to strategic projects
vSAN Helping Dominos Expand Worldwide

Digital global online ordering powered by vSAN

- 40% Cost savings over traditional storage
- Scale: Easily increase capacity and performance – without downtime
- Simple: Generalist admin can install and operate