

vSAN Hardware Quick Reference Guide

The purpose of this document is to provide sample server configurations as directional guidelines for use with VMware vSAN™. Use these guidelines as your first step toward determining the configuration for vSAN.

How to use this document ?

1. Determine your workload profile requirement for your use case
2. Refer to vSAN ReadyNode profiles to determine the approximate configuration that meets your needs
3. Use vSAN Hardware Compatibility Guide to pick a vSAN ReadyNode aligned with the selected profile from the OEM server vendor of choice
4. Refer to blog [What you can and cannot change in ReadyNode](#)

vSAN All Flash Hardware Guidance (Intel)

	AF-8 Series	AF-6 Series	AF-4 Series
Raw Storage Capacity per Node	12 TB	8 TB	4 TB
CPU Cores	24 core	24 core	20 core
Memory*	384 GB	256 GB	128 GB
Capacity Tier Flash	*12 TB (Minimum 3 drives in each disk group) *SSD Endurance Class A or above *SSD Performance Class C or above	*8 TB (Minimum 3 drives in each disk group) *SSD Endurance Class A or above *SSD Performance Class C or above	*4 TB (Minimum 2 drives in each disk group) *SSD Endurance Class A or above *SSD Performance Class C or above
Caching Tier Flash	*2x400 GB *SSD Endurance Class D or above *SSD Performance Class E or above	*2x200 GB *SSD Endurance Class C or above *SSD Performance Class D or above	*1x200 GB *SSD Endurance Class C or above *SSD Performance Class D or above
Recommended Cache/Capacity Choice	*All NVMe *NVMe + SAS	*All SAS *All NVMe *NVMe + SATA/SAS *SAS + SATA	*All SATA *All SAS *All NVMe *SAS + SATA *NVMe + SATA/SAS
IO Controller**	Queue Depth >= 512	Queue Depth >=512	Queue Depth >= 256
NIC	10 GbE or more	10 GbE or more	10 GbE or more

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vSAN All Flash Hardware Guidance (AMD)

	AMD-AF-8 Series	AMD-AF-6 Series	AMD-AF-4 Series
Raw Storage Capacity per Node	12 TB	8 TB	4 TB
CPU Cores	32 core	24 core	16 core
Memory*	384 GB	256 GB	128 GB
Capacity Tier Flash	*12 TB (Minimum 3 drives in each disk group) *SSD Endurance Class A or above *SSD Performance Class C or above	*8 TB (Minimum 3 drives in each disk group) *SSD Endurance Class A or above *SSD Performance Class C or above	*4 TB (Minimum 2 drives in each disk group) *SSD Endurance Class A or above *SSD Performance Class C or above
Caching Tier Flash	*2x400 GB *SSD Endurance Class D or above *SSD Performance Class E or above	*2x200 GB *SSD Endurance Class C or above *SSD Performance Class D or above	*1x200 GB *SSD Endurance Class C or above *SSD Performance Class D or above
Recommended Cache/Capacity Choice	*All NVMe *NVMe + SAS	*All SAS *All NVMe *NVMe + SATA/SAS *SAS + SATA	*All SATA *All SAS *All NVMe *SAS + SATA *NVMe + SATA/SAS
IO Controller**	Queue Depth >= 512	Queue Depth >=512	Queue Depth >= 256
NIC	10 GbE or more	10 GbE or more	10 GbE or more

Note:

*Memory: Use balanced DIMM population as recommended by OEM partner to avoid any performance penalty(For example: Maintaining 1DIMM-Per-Channel is one of the recommendations)

**Queue Depth: Queue Depth of the controller has to be the aggregated Queue Depth of all it's connecting device(same or greater)

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vSAN Hybrid Hardware Guidance (Intel)

	HY-8 Series	HY-6 Series	HY-4 Series	HY-2 Series
Raw Storage Capacity per Node	12 TB	8 TB	4 TB	2 TB
CPU Cores	24 core	20 core	16 core	6 core
Memory	384 GB	256 GB	128 GB	32 GB
Capacity Tier Disk	*12 TB (Minimum 3 drives in each disk group) *SAS 10K RPM	*8 TB (Minimum 3 drives in each disk group) *NL-SAS 7.2K RPM	*4 TB (Minimum 2 drives in each disk group) *NL-SAS 7.2K RPM	*2 TB (Minimum 2 drives in each disk group) *NL-SAS 7.2K RPM
Caching Tier Flash	*2x400 GB *SSD Endurance Class >=D *SSD Performance Class >=E	*2x200 GB *SSD Endurance Class >=C *SSD Performance Class >=D	*1x200 GB *SSD Endurance Class >=C *SSD Performance Class >=D	*1x200 GB *SSD Endurance Class >=B *SSD Performance Class >=B
IO Controller	Queue Depth >= 512	Queue Depth >= 256	Queue Depth >=256	Queue Depth >=256
NIC	10 GbE	10 GbE	10 GbE	10 GbE

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vSAN Hybrid Hardware Guidance (AMD)

	AMD-HY-8 Series	AMD-HY-6 Series	AMD-HY-4 Series	AMD-HY-2 Series
Raw Storage Capacity per Node	12 TB	8 TB	4 TB	2 TB
CPU Cores	32 core	24 core	16 core	8 core
Memory	384 GB	256 GB	128 GB	32 GB
Capacity Tier Flash	*12 TB (Minimum 3 drives in each disk group) *SAS 10K RPM	*8 TB (Minimum 3 drives in each disk group) *NL-SAS 7.2K RPM	*4 TB (Minimum 2 drives in each disk group) *NL-SAS 7.2K RPM	*2 TB (Minimum 2 drives in each disk group) *NL-SAS 7.2K RPM
Caching Tier Flash	*2x400 GB *SSD Endurance Class >=D *SSD Performance Class >=E	*2x200 GB *SSD Endurance Class >=C *SSD Performance Class >=D	*1x200 GB *SSD Endurance Class >=C *SSD Performance Class >=D	*1x200 GB *SSD Endurance Class >=B *SSD Performance Class >=B
IO Controller	Queue Depth >= 512	Queue Depth >= 256	Queue Depth >=256	Queue Depth >=256
NIC	10 GbE	10 GbE	10 GbE	10 GbE

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vSAN Edge Hardware Guidance

	SF-AF	SF-HY
Raw Storage Capacity per Node	0.6 TB	0.6 TB
Total CPU Cores	6 core	6 core
Memory*	32 GB	32 GB
Capacity Tier	*600 GB (Minimum 1 capacity drive in each disk group) *Performance Class C or above *Endurance Class A or above	*600 GB (Minimum 1 capacity drive in each disk group) *NL-SAS 7.2KRPM
Caching Tier Flash	*1x350 GB (Minimum 1 capacity drive in each disk group) *Performance Class C or above *Endurance Class C or above	*1x350 GB (Minimum 1 capacity drive in each disk group) *Performance Class B or above *Endurance Class B or above
IO Controller**	Queue Depth >= 256	Queue Depth >= 256
NIC	10 GbE or more	10 GbE or more

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Sizing Assumptions Used For vSAN ReadyNode Profiles

Disk Group Caching Tier to Capacity Tier Ratio	<ul style="list-style-type: none">*Disk Group Ratio: 1 SSD, 1 to 7 HDDs*>=10% anticipated used capacity* For all flash caching guideline, refer the blog here
ESXi Boot	<ul style="list-style-type: none">* Please follow vSphere boot guidance at https://kb.vmware.com/s/article/85685
Network	<ul style="list-style-type: none">*Minimum two server side network adapter uplinks*(Dual port NIC) recommended for redundancy
SAS Expanders	<ul style="list-style-type: none">*SAS Expanders are supported only on a per platform basis. Check Ready Node listings for support. In absence of SAS expander support for a Ready Node, only 8 drives supported per controller. Add an extra controller if >8 drives are required.
Device Capacity	<ul style="list-style-type: none">*The capacity point for caching and capacity tier is for guidance only. You can choose different capacity points as long as Performance and Endurance classes are met.

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Design Considerations Used For vSAN ReadyNode Profiles

Controller Queue Depth	*Controller queue depth impacts the rebuild/resync times. A low controller queue depth may impact the availability of your production VMs during rebuild/resync. A minimum queue depth of 256 is required in vSAN. Some profiles require minimum queue depth of 512 as noted above.
Number of disk groups	*The number of disk groups impacts fault isolation as well as rebuild/resync times. ***Fault isolation: Configuring more than 1 disk group allows better tolerance against SSD failures since data is spread across more disk groups. ***Rebuild/resync times: Configuring more than 1 disk group allows faster rebuilds/resyncs.
Number of capacity drives (HDDs in Hybrid config / SSD in All Flash Configs) in a disk group	*The number of capacity tier drives in a disk group has an impact of the performance of vSAN. While a single capacity tier drive is the minimum requirement for a disk group, for better performance when there are more VMs, and better handling of rebuild/resync activities, we recommend configuring more than 1 capacity tier drive per caching tier SSD per our guidance above.
Class of SSDs	*The class of SSD you choose has a direct impact on the performance of your overall system.
Balanced vs Unbalanced cluster	*An unbalanced cluster can impact vSAN performance as well as the rebuild/resync times. A balanced cluster delivers more predictable performance even during hardware failures. In addition, performance impact during resync/rebuild is minimal when the cluster is balanced.
1G vs 10G Ethernet	*The choice of 1G vs 10G Ethernet has an impact of the vSAN performance. Both 1G and 10G networks are supported. For larger, higher performing workloads, 10G interconnect is recommended.
De-duplication, Compression and Erasure Coding Considerations	*The sizing does not account for De-duplication, Compression and Erasure Coding. Please visit vSAN Sizing Calculator. If you want to size with storage efficiency turned on and then pick the right Ready Node profile.
Device Protocol	*The ReadyNode are certified with particular device type (SAS/SATA/NVMe/HDD). You are not allowed to change the device type.

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Performance Classes for SSDs

SSD PERFORMANCE CLASS	SSD Tier	WRITES PER SECOND
B	vSAN Hybrid - Caching	5000 - 9999
C	vSAN Hybrid - Caching vSAN All Flash - Capacity	10000 - 19999
D	vSAN Hybrid - Caching vSAN All Flash - Caching for Medium workloads vSAN All Flash - Capacity	20000 - 29999
E	vSAN Hybrid - Caching vSAN All Flash - Caching for Medium workloads vSAN All Flash - Capacity	30000 - 99999
F	vSAN Hybrid - Caching vSAN All Flash - Caching for High workloads vSAN All Flash - Capacity	100000 - 349999
G	vSAN Hybrid - Caching vSAN All Flash - Caching for High workloads vSAN All Flash - Capacity	350000+

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Endurance Classes for SSDs

SSD ENDURANCE CLASS	SSD TIER	TB WRITES IN 5 YEARS
A	vSAN All Flash - Capacity	365
B	vSAN Hybrid - Caching	1825
C	vSAN All Flash - Caching for Medium workloads	3650
D	vSAN All Flash - Caching for High workloads	7300

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Additional Resources

[vSAN Ready Node Configurator](#)

[vSAN ReadyNode™ Sizer](#)

[HCI Assessment Tool](#)

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