NexentaStor 5.x Hardware Certification List (HCL)

Nexenta Certification Team

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Preface

Intended Audience

This document is intended for Nexenta partners and Nexenta customer-facing organizations. The latest version of this document is available through the Nexenta Partner Portal.

Comments

For comments and inquiries, send email to pm@nexenta.com. Refer to specific pages, sections, and paragraphs whenever possible.

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Document History

Date	Description
8/22/2017	**Additions:** Section 6.2.3: Supermicro Hybrid RAs based on SC946SE2C-R1K66JBOD 60 Bay enclosure. Section 6.3.2: Supermicro All-Disk RAs based on SC946SE2C-R1K66JBOD 60 Bay enclosure. Multiple new sections for HGST Storage Platform configurations HGST 2U24 Flash Storage Platform sections with Cisco, Dell, Lenovo and Supermicro HGST 4U60G2 Storage Platform sections with Cisco, Dell, Lenovo and Supermicro Section 8.1: • Addition of Ericsson CRU 0101 and SRU 0101 configurations • Addition of Supermicro 2U 24x 3.5" Simply Double storage server Section 8.2 - CS Building Blocks: • Added Intel X710 10GbE NICs (2 port and 4 port), including AOC-STG-i4T • Added Intel XXV710 25GbE NIC • Added ATTO FC-322E 32Gbps Fibre Channel HBA • Added HGST 4U60G2 (12G SAS) • Added HGST 2U24 Section 10: MetroHA configurations with NexentaStor 5.1 and up **Modifications:** Updated Section 4.1 – calling out 3.84TB and 7.68TB SSDs in Lenovo All-Flash Updated Section 9 on Virtual NAS Configurations Updated all All-Disk RAs with recommendation of adding SLOGs to each pool Updated Appendix A: Supported SSDs Moved all SanDisk InfiniFlash sections to Appendix C – Legacy Configurations
3/20/2017	**Additions:** Sections 4.2.3 and 4.3.2: new Lenovo RAs with D3284 84 Bay enclosure Section 7: new Supermicro Unified Storage Appliances powered by Nexenta Section 8.1 Certified Solutions: • Added Ericsson HDS 8000 CSU + SSU Section 8.2 – CS Building Blocks: • Added LSI 9305-16e HBA • Added ATTO Celerity FC-162E and FC-162P • HGST 4U60G1 Chassis Management supported from 5.0.3 onwards **Modifications:** Items marked white on grey are supported, but not recommended for new deployments Section 5.1 – StorMax RAs: Updated CPUs to Intel v4 versions Section 5.1: StorMax chassis management supported from 5.0.2 onwards Section 6:Added the AOC-STG-i2T as a NIC option in all Reference Architectures Section 6.1: Deleted SBB section Section 6.2: Deleted SBB section Section 6.2.2 – SMC X10 Hybrid – 24 Bay: Replaced E5-2609v4 with E5-2620v4 Section 6.2.3 – SMC X10 Hybrid – 44 Bay: Replaced E5-2609v4 with E5-2620v4 Appendix A: marked a number of SSDs as white on grey
10/25/2016	Initial version

1 Overview

1.1 Introduction

NexentaStor is Nexenta's flagship Software Defined Storage (SDS) platform, allowing thousands of customers all around the world to transform their storage infrastructure, increase flexibility and agility, simplify management, and dramatically reduce costs without compromising on availability, reliability, or functionality.

NexentaStor delivers unified file and block storage services, runs on industry standard hardware, scales from tens of terabytes to petabyte configurations, and includes all data management functionalities.

This document is intended for Nexenta Partners and Nexenta customer-facing organizations looking to deploy NexentaStor 5.x. The latest version of the Nexenta Hardware Certification List (HCL) for NexentaStor 5.x is posted on Partner Portal. A separate HCL document is available for NexentaStor 4.0.

1.2 NexentaStor Solutions

1.2.1 Reference Architectures (RA)

A NexentaStor Reference Architecture comprises specific servers and storage enclosure configurations from a specific server vendor. There is flexibility in choosing your SSDs and HDDs accordingly to match capacity and performance requirements. The main components of a reference architecture are:
Controllers: x86 servers with specific CPU, memory, NICs, and HBAs
Storage enclosures: JBOD with specific HDDs and SSDs
NexentaStor software

The detailed list of components for each partner-specific RA configurations (All-Flash, Hybrid, or All-Disk) start in Section 2.0. Nexenta and hardware technology partners (such as Cisco, Dell, Lenovo, StorMax, Supermicro and others) collaborate to certify NexentaStor software on each reference architecture configuration. In most cases, hardware technology partners offer consolidated SKUs for RA configurations to simplify ordering and support of NexentaStor solutions.

As a result, reference architectures provide the fastest path to market for Nexenta Partners.

1.2.2 Certified Solutions (CS)

A NexentaStor Certified Solution (CS) comprises servers and storage enclosure configurations typically customized by a channel partner or reseller. Certified solutions generally use different server configurations from those supported in reference architectures, and pair them with storage enclosures from different hardware providers. All Certified Solutions must pass Nexenta Certification Testing before they can be added on the HCL and formally supported.

A specific certification may be a lengthy process depending on the nature of the certification and will require extra efforts from both Partners' and Nexenta's engineering resources. Additional fees are required for certification. As a result, it is generally recommended that partners closely review the available set of standard reference architectures when evaluating the need for a particular customized certified solution.

Note: Certified solutions are specific to NexentaStor major releases. For example, a Certified Solution for NexentaStor 4.0 does not automatically carry forward to NexentaStor 5.x and will need to get re-certified.

2 Cisco Reference Architectures

2.1 Cisco All-Flash Configurations

NexentaStor All-Flash configurations deliver very high IOPS and sub millisecond latency for small random IO workloads that are typical of databases, enterprise applications and high performance private cloud (VMware, OpenStack and Hyper–V) environments.

2.1.1 Cisco C240 and HGST 2U24 All-Flash

The following reference architectures are based on the following HGST 2U24 Flash Storage Platforms:

HGST Model Number	Configuration
1ES0107	12x 3.84TB 1 DWPD SAS SSDs
1ES0110	24x 3.84TB 1 DWPD SAS SSDs
1ES0108	12x 7.68TB 1 DWPD SAS SSDs
1ES0111	24x 7.68TB 1 DWPD SAS SSDs

Cisco and HGST RA	NCH-AF-24	NCH-AF-48	NCH-AF-72	NCH-AF-96
Raw Capacity	Up to 184TB	Up to 368TB	Up to 552TB	Up to 737TB
Device Slots	24	48	72	96
Form Factor (HA)	6U	8U	10U	12U
Memory (HA)	512GB			
10GbE Ports	4			
Software	NexentaStor 5.x			

Cisco and HGST RA	NCH-AF-24	NCH-AF-48	NCH-AF-72	NCH-AF-96
Controller	1x or 2x C240 M4SX			
CPU	E5-2643 v4 3.4GHz, 6 cores, 2 socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 480GB internal SSD			
SAS HBA (external)	1x Cisco 9300-8e 12Gb SAS	2x Cisco 9300-8e 12Gb SAS	3x Cisco 9300-8e 12Gb SAS	4x Cisco 9300-8e 12Gb SAS
NIC	Intel X520 10GbE Dual Port SFP+ Intel X540 10GbE Dual Port Base T			
FC HBA	Emulex LPe 12002, LPe 16002-MC QLogic QLE 2562. QLE 2672			
Storage Enclosure	1x HGST 2U24	2x HGST 2U24	3x HGST 2U24	4x HGST 2U24
Data Device #	Up to 24	Up to 48	Up to 72	Up to 96
Flash Device	3.84TB SAS SSD (1 DWPD) 7.68TB SAS SSD (1 DWPD)			
L2ARC	n/a			
ZIL /SLOG	n/a			

Note 1: BIOS version for Cisco C240 M4SX is C240M4.2.0.6a.0.051220151501 or later.
Note 2: There is no need for separate ZIL or L2ARC devices in all-SSD configurations.
Note 3: Chassis management for the HGST 2U24 enclosure is targeted for NexentaStor 5.1.1.

2.2 Cisco Hybrid / All-Disk Configurations

NexentaStor Hybrid configurations deliver great sync write performance and are best suited for mixed read/write workloads with small random IO that are typical of private cloud (VMware, OpenStack and Hyper-V) storage backend, generic file services and high performance backup and archive use cases.

NexentaStor All-Disk configurations are best suited for backup and archive type use cases, sequential workloads and read intensive workloads.

Cisco server and storage enclosure pairings are limited to the following building blocks only. Variations in the following components are permitted:
Controller: CPU type, DRAM capacity, type and count for SAS HBA, NIC and FC HBA
Storage enclosure: HDD type and count, SSD type and count

2.2.1 Cisco C240 Standalone Hybrid

Single node (non-HA) storage appliance based on a single Cisco C240 M4SX running NexentaStor 5.x in a 2U chassis.

Cisco Standalone RA	NC-H-24 (Non-HA)
Max Raw Capacity	Up to 44TB (22x 2TB)
Device Slots	24
Form Factor (total)	2U
Memory (total)	128GB
Read Cache	n/a
10GbE Ports	2
Software	NexentaStor 5.x

Cisco Standalone RA	NC-H-24 (Non-HA)
Controller	1x Cisco C240 M4SX
CPU	E5-2680 v3 2.5GHz, 12 cores, 2 socket E5-2643 v4 3.4GHz, 6 cores, 2 socket
DRAM	128GB (8x 16GB)
Boot Drive	2x 480GB internal SSD
SAS HBA	n/a
Built-in Ethernet	Intel i350 dual-port on the motherboard
NIC	Intel X520 10GbE Dual Port SFP+ Intel X540 10GbE Dual Port Base T
FC HBA	Emulex LPe 12002, LPe 16002-MC QLogic QLE 2562, QLE 2672
Storage	24x 2.5” Data + internal Boot devices
Data HDD	See Cisco supported devices here Note that PCIe devices are not supported.
Data Drive #	Up to 22
L2ARC	n/a
ZIL/SLOG	2x 200GB High Endurance SSD device

Note 1: No chassis management provided.
Note 2: BIOS version for Cisco C240 M4SX is C240M4.2.0.6a.0.051220151501 or later.

2.2.2 Cisco C240 and Seagate Hybrid / All-Disk

Cisco and Seagate RA	NCS-84	NCS-168	NCS-252	NCS-336
Max Raw Capacity	Up to 840TB	Up to 1,680TB	Up to 2,520TB	Up to 3,360TB
Device Slots	84	168	252	336
Form Factor (HA)	9U	14U	19U	24U
Memory (HA)	512GB			
Read Cache	Up to 400GB		Up to 800GB	
10GbE Ports	4			
Software	NexentaStor 5.x			

Cisco and Seagate RA	NCS-84	NCS-168	NCS-252	NCS-336
Controller	2x C240 M4SX			
CPU	E5-2680 v3 2.5GHz, 12 cores, 2 socket E5-2643 v4 3.4GHz, 6 cores, 2 socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 480GB internal SSD			
SAS HBA (external)	1x Cisco 9300-8e 12Gb SAS	2x Cisco 9300-8e 12Gb SAS	3x Cisco 9300-8e 12Gb SAS	4x Cisco 9300-8e 12Gb SAS
NIC	Intel X520 10GbE Dual Port SFP+ Intel X540 10GbE Dual Port Base T			
FC HBA	Emulex LPe 12002, LPe 16002-MC QLogic QLE 2562, QLE 2672			
Storage Enclosure	1x Seagate SP-2584	2x Seagate SP-2584	3x Seagate SP-2584	4x Seagate SP-2584
Data Drive #	Up to 84	Up to 168	Up to 252	Up to 336
Data HDD	Seagate 2TB NL SAS 7.2 PN: ST2000NM0135 Seagate 4TB NL SAS 7.2 PN: ST4000NM0125 Seagate 6TB NL SAS 7.2 PN: ST6000NM0095 Seagate 8TB NL SAS 7.2 PN: ST8000NM0075 Seagate 10TB NL SAS 7.2 PN: ST10000NM0086			
L2ARC (Optional)	Seagate 1200.2 400GB SSD 3DWPD per pool PN: ST400FM0303			
ZIL /SLOG (Optional)	Pair of Seagate 1200.2 200GB 25 DWPD SSD per pool PN: ST200FM0133			

Note 1: BIOS version for Cisco C240 M4SX is C240M4.2.0.6a.0.051220151501 or later.

Note 2: In order to support the highest levels of performance, resilience and redundancy for a NexentaStor deployment, SAS cabling from the head nodes to the JBOD should track the following rules of thumb:

- Unless otherwise specified, all JBODs should be direct connected to SAS HBAs, no intermediate SAS switches, no chaining of JBODs.
- Cabling for HA configurations should be connected to be redundant across HBAs, JBODs and JBOD controllers/expanders.
- Cabling for HA configurations should be consistent with the ports used on each node from the HBA to the ports on the JBOD controller/expander.

2.2.3 Cisco C240 and HGST 4U60G2 Hybrid / All-Disk

Cisco and HGST RA	NCH-60	NCH-120	NCH-180	NCH-240
Max Raw Capacity	Up to 696TB	Up to 1,416TB	Up to 2,136TB	Up to 2,856TB
Device Slots	60	120	180	240
Form Factor (HA)	8U	12U	16U	20U
Memory (HA)	512GB			
Read Cache	800GB		Up to 1.6TB	
10GbE Ports	4			
Software	NexentaStor 5.x			

Cisco and HGST RA	NCH-60	NCH-120	NCH-180	NCH-240
Controller	2x C240 M4SX			
CPU	E5-2643 v4 3.4GHz, 6 cores, 2 socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 480GB internal SSD			
SAS HBA (external)	1x Cisco 9300-8e 12Gb SAS	2x Cisco 9300-8e 12Gb SAS	3x Cisco 9300-8e 12Gb SAS	4x Cisco 9300-8e 12Gb SAS
NIC	Intel X520 10GbE Dual Port SFP+ Intel X540 10GbE Dual Port Base T			
FC HBA	Emulex LPe 12002, LPe 16002-MC QLogic QLE 2562, QLE 2672			
Storage Enclosure	1x HGST 4U60G2	2x HGST 4U60G2	3x HGST 4U60G2	4x HGST 4U60G2
Data Drive #	Up to 60	Up to 120	Up to 180	Up to 240
Data HDD	HGST Ultrastar 6TB air HDDs HGST Ultrastar 8TB helium HDDs HGST Ultrastar 10TB helium HDDs HGST Ultrastar 12TB helium HDDs			
L2ARC (Optional)	800GB SAS SSD (3 DWPD) per pool			
ZIL /SLOG	2x 400GB SAS SSD (10 DWPD) per pool			

Note 1: BIOS version for Cisco C240 M4SX is C240M4.2.0.6a.0.051220151501 or later.
Note 2: Use dual SAS path for configurations with up to 4 enclosures.
Note 3: Chassis management for the HGST 4U60G2 enclosure is supported in NexentaStor 5.1 and up.

3 Dell Reference Architectures

3.1 Dell All-Flash Configurations

NexentaStor All-Flash configurations deliver very high IOPS and sub millisecond latency for small random IO workloads that are typical of databases, enterprise applications and high performance private cloud (VMware, OpenStack and Hyper-V) environments.

3.1.1 Dell R730 and R730xd All-Flash

Dell All-Flash RA	NDxd-AF-24-13G (Non-HA)	NDxd-AF-48-13G (Non-HA)	ND-AF-96-13G (HA)
Raw Capacity	Up to 92TB	Up to 184TB	Up to 368TB
Device Slots	24	48	Up to 96
Form Factor	2U	4U	Up to 12U
Memory (total)	256GB		512GB
Built-in Ethernet	2x 1GbE + 2x 10GbE		
10GbE Ports	2		4
Software	NexentaStor 5.x		

Dell All-Flash RA	NDxd-AF-24-13G (Non-HA)	NDxd-AF-48-13G (Non-HA)	ND-AF-96-13G (HA)
Controller	1x R730xd PN: 210-AHXR	1x R730xd PN: 210-AHXR	2x R730 PN: 210-AEZO
CPU	E5-2643 v4, 3.4GHz, 6-core, 2-socket		
DRAM	256GB		
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)		
SAS HBA	H730 (For SysPool and R730xd data drives, H730 data drives must be in pass through mode only) Dell SAS 12Gb HBA PN: 405-AAEB[4]		2x Dell SAS 12Gb HBA PN: 405-AAEB
NIC	1x Network Daughter Card: Intel i350 DP + Intel X520 DP 10GbE SFP+ or X540 DP 10GbE RJ45 Optional: Intel X520 10GbE SFP+ Intel X540 10GbE RJ45		
FC HBA (optional)	Emulex LPe 12002, LPe 16002B QLogic QLE 2562, QLE 2662		
Storage Enclosure	N/A	1x MD1420 (24-bay) PN: 210-AEWI	1x to 4x MD1420 (24-bay) PN: 210-AEWI
Total Drive #	Up to 24	Up to 48	Up to 96
Flash Device	1.92TB SSD MU 12Gb 2.5” 3.84TB SSD MU 12Gb 2.5”		
L2ARC	n/a		
ZIL/SLOG	n/a		

Note 1: For Dell deployments, please use Nexenta-specific platform SKUs in DellStar or Gii ordering system.
Note 2: BIOS for R730xd and R730 systems with the v4 CPU is 2.0.2 or later.
Note 3: All-SSD configurations are supported on the R730xd platform. There is no need for separate ZIL or L2ARC devices in all-SSD configurations.
Note 4: This is for external connectivity only. The low profile option (Dell SAS 12Gb HBA PN: 405-AAFB) can be used if the full height slots run out.

3.2 Dell Hybrid Configurations

NexentaStor Hybrid configurations deliver great sync write performance and are best suited for mixed read/write workloads with small random IO that are typical of private cloud (VMware, OpenStack and Hyper-V) storage backend, generic file services and high performance backup and archive use cases.

3.2.1 Dell R730xd Hybrid

Reference Architectures with Dell R730xd servers and NexentaStor 5.x provide single node (non-HA) configurations combining controller and storage in a single 2U chassis, with optional capacity expansion to an additional 2U enclosure.

Dell R730xd Hybrid RA	NDxd-H-24-13G (with 2.5" Drives)	NDxd-H-12-13G (with 3.5" Drives)	NDxd-H-48-13G (with 2.5" Drives)	NDxd-H-24-13G (with 3.5" Drives)
Raw Capacity	Up to 44TB	Up to 40TB	Up to 92TB	Up to 88TB
Device Slots	24	12	48	24
Form Factor	2U		4U	
Memory	128GB (8x16GB)			
Read Cache	n/a			
10GbE Ports	2			
Software	NexentaStor 5.x			

Dell R730xd Hybrid RA	NDxd-H-24-13G (with 2.5" Drives)	NDxd-H-12-13G (with 3.5" Drives)	NDxd-H-48-13G (with 2.5" Drives)	NDxd-H-24-13G (with 3.5" Drives)
Controller	1x R730xd PN: 210-AHXR			
CPU	E5-2609 v3 1.9GHz, 6-core, 2-socket E5-2609 v4 1.7GHz, 8-core, 2-socket			
DRAM	128GB (8x16GB)			
Boot Drive	2TB (2x 1TB SAS 7.2k 2.5")			
SAS HBA	H730 (For SysPool and data drives; data drives must be in pass through mode only)		H730 (For SysPool and R730xd data drives, H730 data drives must be in pass through mode only) Dell SAS 12Gb HBA PN: 405-AAEB [3]	
NIC	1x Network Daughter Card: Intel i350 DP + Intel X520 DP 10GbE SFP+ or X540 DP 10GbE RJ45 Optional: Intel X520 10GbE SFP+ Intel X540 10GbE RJ45			
FC HBA (optional)	Emulex LPe 12002, LPe 16002B QLogic QLE 2562, QLE 2662			
Storage Enclosure	Internal Only 24x 2.5" + 2x Flex Bay	Internal Only 12x 3.5" + 2x Flex Bay	1x MD1420 PN: 210- AEWI	1x MD1400 PN: 210-AFDZ
Data HDD	2.5" 7.2K SAS HDD ≤ 2TB 2.5" 10k SAS HDD ≤ 1.8TB 2.5" 15k SAS HDD ≤ 600GB	3.5" 7.2k SAS HDD - 2TB 3.5" 7.2k SAS HDD - 4TB	2.5" 7.2K SAS HDD ≤ 2TB 2.5" 10k SAS HDD ≤ 1.8TB 2.5" 15k SAS HDD ≤ 600GB	3.5" 7.2k SAS HDD - 2TB 3.5" 7.2k SAS HDD - 4TB
Data Drive #	22	10	46	22
L2ARC	n/a		n/a	
ZIL/SLOG	2x Dell 400GB WI 12Gb 2.5"		2x Dell 400GB WI 12Gb 2.5"	

Note 1: For Dell deployments, please use Nexenta-specific platform SKUs in DellStar or Gii ordering system.
Note 2: BIOS for R730xd system with v3 CPU is 1.1.4 or later. For systems with the v4 CPU, BIOS version is 2.0.2 or later.
Note 3: This is for external connectivity only. The low profile option (Dell SAS 12Gb HBA PN: 405-AAFB) can be used if there are no more full height slots available.

3.2.2 Dell R730 Hybrid – MD14xx

Dell R730 Hybrid RA	ND-H-2x24-13G	ND-H-4x12-13G	ND-H-8x12-13G
Raw Capacity	Up to 90TB	Up to 180TB	Up to 900TB
Device Slots	48	48	96
Form Factor (Max)	8U	12U	20U
Memory (total)	256GB		
Read Cache	Up to 800GB		Up to 1.6TB
10GbE ports	4		
Software	NexentaStor 5.x		

Dell R730 Hybrid RA	ND-H-2x24-13G	ND-H-4x12-13G	ND-H-8x12-13G
Controller	2x R730 PN: 210-AEZO		
CPU	E5-2609 v3 1.9GHz, 6-core, 2-socket E5-2609 v4 1.7GHz, 8-core, 2-socket		
DRAM	128GB (8x 16GB)		
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5")		
SAS HBA	2x Dell SAS 12Gb HBA PN: 405-AAEB	4x Dell SAS 12Gb HBA PN: 405-AAEB	
	H730 (for internal SysPool drives only)		
NIC	1x Network Daughter Card: Intel i350 DP + Intel X520 DP 10GbE SFP+ or X540 DP 10GbE RJ45 Optional: Intel X520 10GbE SFP+ Intel X540 10GbE RJ45		
FC HBA (Optional)	Emulex LPe 12002, LPe 16002B QLogic QLE 2562, QLE 2662		
Storage Enclosure	2x MD1420 (24-bay) PN: 210-AEWI	4x MD1400 (12-bay) PN: 210-AFDZ	8x MD1400 (12-bay) PN: 210-AFDZ
Data HDD	2.5" 7.2K SAS HDD ≤ 2TB 2.5" 10k SAS HDD ≤ 1.8TB 2.5" 15k SAS HDD ≤ 600GB	3.5" 7.2k SAS HDD – 2TB 3.5" 7.2k SAS HDD – 4TB	3.5" 7.2k SAS HDD – 2TB 3.5" 7.2k SAS HDD – 4TB 3.5" 7.2k SAS HDD – 6TB 3.5" 7.2k SAS HDD – 8TB 3.5" 7.2k SAS HDD – 10TB
Data Drive #	Up to 45	Up to 45	Up to 90
L2ARC	1x Dell 400GB MU 12Gb 2.5" SSD		2x Dell 400GB MU 12Gb 2.5" SSD
ZIL/SLOG	2x Dell 400GB WI SSD		4x Dell 400GB WI SSD

Note 1: For Dell deployments, use Nexenta-specific platform SKUs in DellStar or Gii ordering system.
Note 2: BIOS for R730 system with the v3 CPU should be 1.0.4 and above. BIOS for R730 with v4 CPU is 2.0.2 or later.
Note 3: 10GbE port count takes into account the 2 ports on the server Network Daughter Card.
Note 4: Contact Dell for detailed wiring diagrams for these configurations.

3.2.3 Dell R730 Hybrid – MD3060e and MD1280

Dell R730 Hybrid RA	ND-H-120-13G	ND-H-240-13G	ND-H-168-13G	ND-H-336-13G
Raw Capacity	Up to 1,140TB	Up to 2,340TB	Up to 1,620TB	Up to 3,240TB
Device Slots	120	240	168	336
Form Factor (total)	12U	20U	14U	24U
Memory (total)	512GB			
Read Cache	Up to 800GB			Up to 1.6TB
10GbE ports	4			
Software	NexentaStor 5.x			

Dell R730 Hybrid RA	ND-H-120-13G	ND-H-240-13G	ND-H-168-13G	ND-H-336-13G
Controller	2x R730 PN: 210-AEZO			
CPU	E5-2643 v3 3.4GHz, 6-core, 2-socket E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5")			
SAS HBA	2x LSI SAS 6Gb HBA PN: 406-BBDN	4x LSI SAS 6Gb HBA PN: 406-BBDN	2x LSI SAS 6Gb HBA PN: 406-BBDN	4x LSI SAS 6Gb HBA PN: 406-BBDN
	H730 (for internal SysPool drives only)			
NIC	1x Network Daughter Card: Intel i350 DP + Intel X520 DP 10GbE SFP+ or X540 DP 10GbE RJ45 Optional: Intel X520 10GbE SFP+ Intel X540 10GbE RJ45			
FC HBA (Optional)	Emulex LPe 12002, LPe 16002B QLogic QLE 2562, QLE 2662			
Storage Enclosure	2x MD3060e (60-bay) PN: 210-ACIS	4x MD3060e (60-bay) PN: 210-ACIS	2x MD1280 (84-bay) PN: 210-AIDE	4x MD1280 (84-bay) PN: 210-AIDE
Data HDD	3.5" 7.2k SAS HDD – 2TB 3.5" 7.2k SAS HDD – 4TB 3.5" 7.2k SAS HDD – 6TB 3.5" 7.2k SAS HDD – 8TB 3.5" 7.2k SAS HDD – 10TB		3.5" 7.2k SAS HDD – 2TB 3.5" 7.2k SAS HDD – 4TB 3.5" 7.2k SAS HDD – 6TB 3.5" 7.2k SAS HDD – 8TB 3.5" 7.2k SAS HDD – 10TB	
Data Drive #	Up to 114	Up to 234	Up to 162	Up to 324
L2ARC	2x Dell 400GB MU 12Gb 2.5" SSD			4x Dell 400GB MU 12Gb 2.5" SSD
ZIL/SLOG	4x Dell 400GB WI 12Gb 2.5" SSD			8x Dell 400GB WI 12Gb 2.5" SSD

Note 1: For Dell deployments, use Nexenta-specific platform SKUs in DellStar or Gii ordering system.
Note 2: BIOS for R730 system with the v3 CPU should be 1.0.4 and above. BIOS for R730 with v4 CPU is 2.0.2 or later.
Note 3: 10GbE port count takes into account the 2 ports on the server Network Daughter Card.
Note 4: Contact Dell for detailed wiring diagrams for these configurations.

3.3 Dell R730 All-Disk Configurations

NexentaStor All-Disk configurations are best suited for backup and archive type use cases, sequential workloads and read intensive workloads.

3.3.1 Dell R730 All-Disk – MD3060e and MD1280

Dell R730 All–Disk RA	ND-120-13G	ND-240-13G	ND-168-13G	ND-336-13G	ND-672-13G
Raw Capacity	Up to 1,200TB	Up to 2,400TB	Up to 1,680	Up to 3,360TB	Up to 6,720TB
Device Slots	120	240	168	336	672
Form Factor (Max)	12U	20U	14U	24U	44U
Memory (total)	512GB				
Read Cache	n/a				
10GbE ports	4				
Software	NexentaStor 5.x				

Dell R730 All–Disk RA	ND-120-13G	ND-240-13G	ND-168-13G	ND-336-13G	ND-672-13G
Controller	2x R730 PN: 210-AEZO				
CPU	E5-2643 v3 3.4GHz, 6-core, 2-socket E5-2643 v4 3.4GHz, 6-core, 2-socket				
DRAM	256GB (16x 16GB)				
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)				
SAS HBA	2x LSI SAS 6Gb HBA PN: 406-BBDN	4x LSI SAS 6Gb HBA PN: 406-BBDN	2x LSI SAS 6Gb HBA PN: 406-BBDN	4x LSI SAS 6Gb HBA PN: 406-BBDN	4x LSI SAS 6Gb HBA PN: 406-BBDN
	H730 (for internal SysPool drives only)				
NIC	1x Network Daughter Card: Intel i350 DP + Intel X520 DP 10GbE SFP+ or X540 DP 10GbE RJ45 Optional: Intel X520 10GbE SFP+ Intel X540 10GbE RJ45				
FC HBA (Optional)	Emulex LPe 12002, LPe 16002B QLogic QLE 2562, QLE 2662				
Storage Enclosure	2x MD3060e (60-bay) PN: 210-ACIS	4x MD3060e (60-bay) PN: 210-ACIS	2x MD1280 (84-bay) PN: 210-AIDE	4x MD1280 (84-bay) PN: 210-AIDE	8x MD1280 (84-bay) PN: 210-AIDE
Data HDD	3.5” 7.2k SAS HDD – 2TB 3.5“ 7.2k SAS HDD – 4TB 3.5” 7.2k SAS HDD – 6TB 3.5“ 7.2k SAS HDD – 8TB 3.5“ 7.2k SAS HDD – 10TB		3.5” 7.2k SAS HDD – 2TB 3.5“ 7.2k SAS HDD – 4TB 3.5” 7.2k SAS HDD – 6TB 3.5“ 7.2k SAS HDD – 8TB 3.5“ 7.2k SAS HDD – 10TB		
Data Drive #	120	240	168	336	672
L2ARC	n/a				
ZIL/SLOG	n/a				

Note 1: For Dell deployments, use Nexenta-specific platform SKUs in DellStar or Gii ordering system.
Note 2: BIOS for R730 system with the v3 CPU should be 1.0.4 and above. BIOS for R730 with v4 CPU is 2.0.2 or later.
Note 3: 10GbE port count takes into account the 2 ports on the server Network Daughter Card.
Note 4: Contact Dell for detailed wiring diagrams for these configurations.

3.4 Dell and HGST Storage Platform Configurations

3.4.1 Dell R730 and HGST 2U24 All-Flash

The following reference architectures are based on the following HGST 2U24 Flash Storage Platforms:

HGST Model Number	Configuration
1ES0107	12x 3.84TB 1 DWPD SAS SSDs
1ES0110	24x 3.84TB 1 DWPD SAS SSDs
1ES0108	12x 7.68TB 1 DWPD SAS SSDs
1ES0111	24x 7.68TB 1 DWPD SAS SSDs

Dell and HGST RA	NDH-AF-24	NDH-AF-48	NDH-AF-72	NDH-AF-96
Raw Capacity	Up to 184TB	Up to 368TB	Up to 552TB	Up to 737TB
Device Slots	24	48	72	96
Form Factor (HA)	6U	8U	10U	12U
Memory (HA)	512GB			
10GbE Ports	8			
Software	NexentaStor 5.x			

Dell and HGST RA	NDH-AF-24	NDH-AF-48	NDH-AF-72	NDH-AF-96
Controller	1x or 2x **R730** PN: 210-AEZO			
CPU	E5-2643 v4, 3.4GHz, 6-core, 2-socket			
DRAM	256GB per controller			
Boot Drive	2x 1TB SAS 7.2k 3.5” mirrored			
SAS HBA	1x Dell SAS 12Gb HBA	2x Dell SAS 12Gb HBA	3x Dell SAS 12Gb HBA	4x Dell SAS 12Gb HBA
	H730 (for internal SysPool drives only)			
NIC	1x Network Daughter Card: Intel i350 DP + Intel X520 DP SFP+ or X540 DP 10GbE RJ45 and 1x Intel X520 10GbE SFP+ or X540 10GbE RJ45			
FC HBA (optional)	Emulex LPe 12002, LPe 16002B QLogic QLE 2562, QLE 2662			
Storage Enclosure	1x HGST 2U24	2x HGST 2U24	3x HGST 2U24	4x HGST 2U24
Total Device #	Up to 24	Up to 48	Up to 72	Up to 96
Flash Device	3.84TB SAS SSD (1 DWPD) 7.68TB SAS SSD (1 DWPD)			
L2ARC	n/a			
ZIL /SLOG	n/a			

Note 1: BIOS for R730 system with Intel v4 CPU is 2.0.2 or later.
Note 2: There is no need for separate ZIL or L2ARC devices in all-SSD configurations.
Note 3: Chassis management for the HGST 2U24 enclosure is targeted for NexentaStor 5.1.1.

3.4.2 Dell R730 and HGST 4U60G2 Hybrid / All-Disk

Dell R730 HGST RA	NDHG-1x60-13G	NDHG-2x60-13G	NDHG-3x60-13G	NDHG-4x60-13G
Raw Capacity	Up to 696TB	Up to 1,416TB	Up to 2,136TB	Up to 2,856TB
Device Slots	60	120	180	240
Form Factor (total)	8U	12U	16U	20U
Memory (total)	512GB			
Read Cache	800GB		Up to 1.6TB	
10GbE ports	4			
Software	NexentaStor 5.x			

Dell R730 HGST RA	NDHG-1x60-13G	NDHG-2x60-13G	NDHG-3x60-13G	NDHG-4x60-13G
Controller	2x R730 PN: 210-AEZO			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)			
SAS HBA	1x Dell SAS 12Gb HBA PN: 405-AAEB	2x Dell SAS 12Gb HBA PN: 405-AAEB	3x Dell SAS 12Gb HBA PN: 405-AAEB	4x Dell SAS 12Gb HBA PN: 405-AAEB
	H730 (for internal SysPool drives only)			
NIC	1x Network Daughter Card: Intel i350 DP + Intel X520 DP 10GbE SFP+ or X540 DP 10GbE RJ45 Optional: Intel X520 10GbE SFP+ Intel X540 10GbE RJ45			
FC HBA (Optional)	Emulex LPe 12002, LPe 16002B QLogic QLE 2562, QLE 2662			
Storage Enclosure	1x HGST 4U60G2	2x HGST 4U60G2	3x HGST 4U60G2	4x HGST 4U60G2
Data Drive #	Up to 60	Up to 120	Up to 180	Up to 240
Data HDD	HGST Ultrastar 6TB air HDDs HGST Ultrastar 8TB helium HDDs HGST Ultrastar 10TB helium HDDs HGST Ultrastar 12TB helium HDDs			
L2ARC (optional)	800GB SAS SSD (3 DWPD) per pool			
ZIL/SLOG	2x 400GB SAS SSD (10 DWPD) per pool			

Note 1: For Dell deployments, use Nexenta-specific platform SKUs in DellStar or Gii ordering system.
Note 2: BIOS for R730 with v4 CPU is 2.0.2 or later.
Note 3: 10GbE port count takes into account the 2 ports on the server Network Daughter Card.
Note 4: Use dual SAS path for configurations with up to 4 enclosures.
Note 5: Chassis management for the HGST 4U60G2 enclosure is supported in NexentaStor 5.1 and up.

4 Lenovo Reference Architectures

4.1 Lenovo All-Flash Configurations

4.1.1 Lenovo X3650-M5 and D1224 All-Flash

NexentaStor All-Flash configurations deliver very high IOPS and sub millisecond latency for small random IO workloads that are typical of databases, enterprise applications and high performance private cloud (VMware, OpenStack and Hyper–V) environments.

Lenovo All-Flash RA	DX8200N-AF-24	DX8200N-AF-48	DX8200N-AF-72	DX8200N-AF-96
Raw Capacity	Up to 38TB	Up to 76TB	Up to 115TB	Up to 153TB
Device Slots	24	48	72	96
Form Factor (total system)	6U	8U	10U	12U
Memory (total system)	512GB			
10GbE ports	4			
Software	NexentaStor 5.x			

Lenovo All-Flash RA	DX8200N-AF-24	DX8200N-AF-48	DX8200N-AF-72	DX8200N-AF-96
Controller	2x Lenovo X3650-M5			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 1TB, 3.5” 7.2K NL SAS			
SAS HBA	1x N2215 for internal boot devices 2x N2226 for external devices			
NIC	1GbE Broadcom, 10GbE Intel X520 DP, or 10GbE Intel X540 DP			
FC HBA (optional)	8Gb Emulex LPe 12000 (Single) or Emulex LPe 12002 (Dual) 8Gb QLogic QLE-2560 (Single) or QLE-2562 (Dual) 16Gb QLogic QLE-2660 (Single) or QLogic QLE-2662 (Dual)			
Storage Enclosure	1x Lenovo Storage D1224	2x Lenovo Storage D1224	3x Lenovo Storage D1224	4x Lenovo Storage D1224
Total Drive #	Up to 24	Up to 48	Up to 72	Up to 96
Flash Device	High Performance SAS SSDs – 1.6TB 10 DWPD Capacity Optimized SAS SSDs – 3.84TB 3 DWPD Capacity Optimized SAS SSDs – 7.68TB 1 DWPD			
L2ARC	n/a			
ZIL/SLOG	n/a			

Note 1: BIOS for the X3650-M5 servers must be TCE126M. BMC FW version must be TC0018M. X3650-M5 server must be configured with A5FR in Riser 1 and A5R5 in Riser 2.

Note 2: N2226 FW version must be 1.11.02 and NVDATA field in sas3flash-list output must be 0b:00:01:07

Note 3: There is no need for separate ZIL or L2ARC devices in all-SSD configurations. Use dual SAS path for configurations with up to 4 enclosures.

4.2 Lenovo Hybrid Configurations

NexentaStor Hybrid configurations deliver great sync write performance and are best suited for mixed read/write workloads with small random IO that are typical of private cloud (VMware, OpenStack and Hyper-V) storage backend, generic file services and high performance backup and archive use cases.

4.2.1 Lenovo X3650-M5 Hybrid – D1224

Lenovo Hybrid RA	DX8200N-H-2x24	DX8200N-H-4x24	DX8200N-H-6x24	DX8200N-H-8x24
Raw Capacity	Up to 90TB	Up to 186TB	Up to 276TB	Up to 372TB
Device Slots	48	96	144	192
Form Factor (total)	8U	12U	16U	20U
Memory (total)	512GB			
Read Cache	400GB		800GB	
10GbE Ports	4			
Software	NexentaStor 5.x			

Lenovo Hybrid RA	DX8200N-H-2x24	DX8200N-H-4x24	DX8200N-H-6x24	DX8200N-H-8x24
Controller	2x Lenovo X3650-M5			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 1TB, 3.5” 7.2K NL SAS			
SAS HBA	1x N2215 for internal boot devices 2x N2226 for external devices			
NIC	1GbE Broadcom, 10GbE Intel X520 DP, or 10GbE Intel X540 DP			
FC HBA (optional)	8Gb Emulex LPe 12000 (Single) or Emulex LPe 12002 (Dual) 8Gb QLogic QLE-2560 (Single) or QLE-2562 (Dual) 16Gb QLogic QLE-2660 (Single) or QLogic QLE-2662 (Dual)			
Storage Enclosure	2x Lenovo Storage D1224	4x Lenovo Storage D1224	6x Lenovo Storage D1224	8x Lenovo Storage D1224
Data HDD	2.5” 15K SAS HDD - 300GB and 600GB 2.5” 10K SAS HDD - 600GB, 900GB, 1.2TB, and 1.8TB 2.5” 7.2K NL-SAS HDD - 1TB and 2TB			
Data Drive #	Up to 45	Up to 93	Up to 138	Up to 186
L2ARC	1x 400GB SAS SSD 3 DWPD	1x 400GB SAS SSD 3 DWPD	2x 400GB SAS SSD 3 DWPD	2x 400GB SAS SSD 3 DWPD
ZIL/SLOG	2x 400GB SAS SSD 10 DWPD	2x 400GB SAS SSD 10 DWPD	4x 400GB SAS SSD 10 DWPD	4x 400GB SAS SSD 10 DWPD

Note 1: BIOS for the X3650-M5 servers must be TCE126M. BMC FW version must be TC0018M. X3650-M5 server must be configured with A5FR in Riser 1 and A5R5 in Riser 2.

Note 2: N2226 FW version must be 1.11.02 and NVDATA field in sas3flash-list output must be 0b:00:01:07

Note 3: Use dual SAS path for configurations with up to 4 enclosures. Use SAS loops with no more than 2 enclosures per loop for configurations up to 8 enclosures.

4.2.2 Lenovo X3650-M5 Hybrid – D1212

Lenovo Hybrid RA	DX8200N-H-2x12	DX8200N-H-4x12	DX8200N-H-6x12	DX8200N-H-8x12
Raw Capacity	Up to 84TB	Up to 180TB	Up to 264TB	Up to 360TB
Device Slots	24	48	72	96
Form Factor (total)	8U	12U	16U	20U
Memory (total)	512GB			
Read Cache	400GB		800GB	
10GbE Ports	4			
Software	NexentaStor 5.x			

Lenovo Hybrid RA	DX8200N-H-2x12	DX8200N-H-4x12	DX8200N-H-6x12	DX8200N-H-8x12
Controller	2x Lenovo X3650-M5			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 1TB, 3.5” 7.2K NL SAS			
SAS HBA	1x N2215 for internal boot devices 2x N2226 for external devices			
NIC	1GbE Broadcom, 10GbE Intel X520 DP, or 10GbE Intel X540 DP			
FC HBA (optional)	8Gb Emulex LPe 12000 (Single) or Emulex LPe 12002 (Dual) 8Gb QLogic QLE-2560 (Single) or QLE-2562 (Dual) 16Gb QLogic QLE-2660 (Single) or QLogic QLE-2662 (Dual)			
Storage Enclosure	2x Lenovo Storage D1212	4x Lenovo Storage D1212	6x Lenovo Storage D1212	8x Lenovo Storage D1212
Data HDD	3.5” 7.2K NL-SAS HDD - 2TB 3.5” 7.2K NL-SAS HDD - 4TB			
Data Drive #	Up to 21	Up to 45	Up to 66	Up to 90
L2ARC	1x 400GB SAS SSD 3 DWPD	1x 400GB SAS SSD 3 DWPD	2x 400GB SAS SSD 3 DWPD	2x 400GB SAS SSD 3 DWPD
ZIL/SLOG	2x 400GB SAS SSD 10 DWPD	2x 400GB SAS SSD 10 DWPD	4x 400GB SAS SSD 10 DWPD	4x 400GB SAS SSD 10 DWPD

Note 1: BIOS for the X3650-M5 servers must be TCE126M. BMC FW version must be TC0018M. X3650-M5 server must be configured with A5FR in Riser 1 and A5R5 in Riser 2.

Note 2: N2226 FW version must be 1.11.02 and NVDATA field in sas3flash-list output must be 0b:00:01:07

Note 3: Use dual SAS path for configurations with up to 4 enclosures. Use SAS loops with no more than 2 enclosures per loop for configurations up to 8 enclosures.

4.2.3 Lenovo X3650-M5 Hybrid – D3284

Lenovo Hybrid RA	DX8200N-H-1x84	DX8200N-H-2x84	DX8200N-H-3x84	DX8200N-H-4x84
Raw Capacity	Up to 810TB	Up to 1.62PB	Up to 2.43PB	Up to 3.24PB
Device Slots	84	168	252	336
Form Factor (total)	9U	14U	19U	24U
Memory (total)	512GB			
Read Cache	400GB	800GB	1.2TB	1.6TB
10GbE Ports	4			
Software	NexentaStor 5.x			

Lenovo Hybrid RA	DX8200N-H-1x84	DX8200N-H-2x84	DX8200N-H-3x84	DX8200N-H-4x84
Controller	2x Lenovo X3650-M5			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 1TB, 3.5” 7.2K NL SAS			
SAS HBA	1x N2215 for internal boot devices 2x N2226 for external devices			
NIC	1GbE Broadcom, 10GbE Intel X520 DP, or 10GbE Intel X540 DP			
FC HBA (optional)	8Gb Emulex LPe 12000 (Single) or Emulex LPe 12002 (Dual) 8Gb QLogic QLE-2560 (Single) or QLE-2562 (Dual) 16Gb QLogic QLE-2660 (Single) or QLogic QLE-2662 (Dual)			
Storage Enclosure	1x Lenovo Storage D3284 (84 Bay)	2x Lenovo Storage D3284 (84 Bay)	3x Lenovo Storage D3284 (84 Bay)	4x Lenovo Storage D3284 (84 Bay)
Data HDD	3.5” 7.2K NL-SAS HDD - 4TB 3.5” 7.2K NL-SAS HDD - 6TB 3.5” 7.2K NL-SAS HDD – 8TB 3.5” 7.2K NL-SAS HDD – 10TB			
Data Drive #	Up to 81	Up to 162	Up to 243	Up to 324
L2ARC	1x 400GB SAS SSD 3 DWPD	2x 400GB SAS SSD 3 DWPD	3x 400GB SAS SSD 3 DWPD	4x 400GB SAS SSD 3 DWPD
ZIL/SLOG	2x 400GB SAS SSD 10 DWPD	4x 400GB SAS SSD 10 DWPD	6x 400GB SAS SSD 10DWPD	8x 400GB SAS SSD 10 DWPD

Note 1: BIOS for the X3650-M5 servers must be TCE126M. BMC FW version must be TC0018M. X3650-M5 server must be configured with A5FR in Riser 1 and A5R5 in Riser 2.

Note 2: N2226 FW version must be 1.11.02 and NVDATA field in sas3flash-list output must be 0b:00:01:07

Note 3: Use dual SAS path for configurations with up to 4 enclosures. Use SAS loops with no more than 2 enclosures per loop for configurations up to 8 enclosures.

4.3 Lenovo X3650-M5 All-Disk Configurations

NexentaStor All-Disk configurations are best suited for backup and archive type use cases, sequential workloads and read intensive workloads.

4.3.1 Lenovo X3650-M5 All-Disk – D1212

Lenovo All–Disk RA	DX8200N-2x12	DX8200N-4x12	DX8200N-6x12	DX8200N-8x12
Raw Capacity	Up to 240TB	Up to 480TB	Up to 720TB	Up to 960TB
Device Slots	24	48	72	96
Form Factor (total)	8U	12U	16U	20U
Memory (total)	512GB			
Read Cache	400GB		800GB	
10GbE Ports	4			
Software	NexentaStor 5.x			

Lenovo All–Disk RA	DX8200N-2x12	DX8200N-4x12	DX8200N-6x12	DX8200N-8x12
Controller	2x Lenovo X3650-M5			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 1TB, 3.5” 7.2K NL SAS			
SAS HBA	1x N2215 for internal boot devices 2x N2226 for external devices			
NIC	1GbE Broadcom, 2x 10GbE Intel X520 DP, or 10GbE Intel X540 DP			
FC HBA (optional)	8Gb Emulex LPe 12000 (Single) or Emulex LPe 12002 (Dual) 8Gb QLogic QLE-2560 (Single) or QLE-2562 (Dual) 16Gb QLogic QLE-2660 (Single) or QLogic QLE-2662 (Dual)			
Storage Enclosure	2x Lenovo Storage D1212	4x Lenovo Storage D1212	6x Lenovo Storage D1212	8x Lenovo Storage D1212
Data HDD	3.5” 7.2K NL-SAS HDD - 2TB 3.5” 7.2K NL-SAS HDD - 4TB 3.5” 7.2K NL-SAS HDD - 6TB 3.5” 7.2K NL-SAS HDD - 8TB 3.5” 7.2K NL-SAS HDD - 10TB			
Data Drive #	Up to 24	Up to 48	Up to 72	Up to 96
L2ARC	n/a			
ZIL/SLOG	Recommended: 2x 400GB SAS SSD (10 DWPD) per pool			

Note 1: BIOS for the X3650-M5 servers must be TCE126M. BMC FW version must be TC0018M. X3650-M5 server must be configured with A5FR in Riser 1 and A5R5 in Riser 2.

Note 2: N2226 FW version must be 1.11.02 and NVDATA field in sas3flash-list output must be 0b:00:01:07

Note 3: Use dual SAS path for configurations with up to 4 enclosures. Use SAS loops with no more than 2 enclosures per loop for configurations up to 8 enclosures.

4.3.2 Lenovo X3650-M5 All-Disk – D3284

Lenovo Hybrid RA	DX8200N-2x84	DX8200N-4x84	DX8200N-6x84	DX8200N-8x84
Raw Capacity	Up to 1.68PB	Up to 3.36PB	Up to 5.04PB	Up to 6.72PB
Device Slots	168	336	504	672
Form Factor (total)	14U	24U	34U	44U
Memory (total)	512GB			
Read Cache	n/a			
10GbE Ports	4			
Software	NexentaStor 5.x			

Lenovo Hybrid RA	DX8200N-2x84	DX8200N-4x84	DX8200N-6x84	DX8200N-8x84
Controller	2x Lenovo X3650-M5			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 1TB, 3.5” 7.2K NL SAS			
SAS HBA	1x N2215 for internal boot devices 2x N2226 for external devices			
NIC	1GbE Broadcom, 10GbE Intel X520 DP, or 10GbE Intel X540 DP			
FC HBA (optional)	8Gb Emulex LPe 12000 (Single) or Emulex LPe 12002 (Dual) 8Gb QLogic QLE-2560 (Single) or QLE-2562 (Dual) 16Gb QLogic QLE-2660 (Single) or QLogic QLE-2662 (Dual)			
Storage Enclosure	2x Lenovo Storage D3284 (84 Bay)	4x Lenovo Storage D3284 (84 Bay)	6x Lenovo Storage D3284 (84 Bay)	8x Lenovo Storage D3284 (84 Bay)
Data HDD	3.5” 7.2K NL-SAS HDD - 4TB 3.5” 7.2K NL-SAS HDD - 6TB 3.5” 7.2K NL-SAS HDD – 8TB 3.5” 7.2K NL-SAS HDD – 10TB			
Data Drive #	Up to 168	Up to 336	Up to 504	Up to 672
L2ARC	n/a			
ZIL/SLOG	Recommended: 2x 400GB SAS SSD (10 DWPD) per pool			

Note 1: BIOS for the X3650-M5 servers must be TCE126M. BMC FW version must be TC0018M. X3650-M5 server must be configured with A5FR in Riser 1 and A5R5 in Riser 2.

Note 2: N2226 FW version must be 1.11.02 and NVDATA field in sas3flash-list output must be 0b:00:01:07

Note 3: Use dual SAS path for configurations with up to 4 enclosures. Use SAS loops with no more than 2 enclosures per loop for configurations up to 8 enclosures.

4.4 Lenovo and HGST Storage Platform Configurations

4.4.1 Lenovo X3650-M5 and HGST 2U24 All-Flash

The following reference architectures are based on the following HGST 2U24 Flash Storage Platforms:

HGST Model Number	Configuration
1ES0107	12x 3.84TB 1 DWPD SAS SSDs
1ES0110	24x 3.84TB 1 DWPD SAS SSDs
1ES0108	12x 7.68TB 1 DWPD SAS SSDs
1ES0111	24x 7.68TB 1 DWPD SAS SSDs

Lenovo and HGST RA	NLH-AF-24	NLH-AF- 48	NLH-AF-72	NLH-AF-96
Raw Capacity	Up to 184TB	Up to 368TB	Up to 552TB	Up to 737TB
Device Slots	24	48	72	96
Form Factor (total)	6U	8U	10U	12U
Memory (total)	512GB			
10GbE Ports	8			
Software	NexentaStor 5.x			

Lenovo and HGST RA	NLH-AF-24	NLH-AF-48	NLH-AF-72	NLH-AF-96
Controller	2x Lenovo X3650-M5			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 1TB, 3.5” 7.2K NL SAS			
SAS HBA	1x N2215 for internal boot devices 2x N2226 for external devices			
NIC	1GbE Broadcom, 2x 10GbE Intel X520 DP, or 10GbE Intel X540 DP			
FC HBA (optional)	8Gb Emulex LPe 12000 (Single) or Emulex LPe 12002 (Dual) 8Gb QLogic QLE-2560 (Single) or QLE-2562 (Dual) 16Gb QLogic QLE-2660 (Single) or QLogic QLE-2662 (Dual)			
Storage Enclosure	1x HGST 2U24	2x HGST 2U24	3x HGST 2U24	4x HGST 2U24
Total Device #	Up to 24	Up to 48	Up to 72	Up to 96
Flash Device	3.84TB SAS SSD (1 DWPD) 7.68TB SAS SSD (1 DWPD)			
L2ARC	n/a			
ZIL /SLOG	n/a			

Note 1: BIOS for the X3650-M5 servers must be TCE126M. BMC FW version must be TC0018M. X3650-M5 server must be configured with A5FR in Riser 1 and A5R5 in Riser 2.
Note 2: N2226 FW version must be 1.11.02 and NVDATA field in sas3flash-list output must be 0b:00:01:07
Note 3: There is no need for separate ZIL or L2ARC devices in all-SSD configurations.
Note 4: Chassis management for the HGST 2U24 enclosure is targeted for NexentaStor 5.1.1.

4.4.2 Lenovo X3650-M5 & HGST 4U60G2 Hybrid / All-Disk

Lenovo HGST RA	DX8200N-HG-1x60	DX8200N-HG-2x60	DX8200N-HG-3x60	DX8200N-HG-4x60
Raw Capacity	Up to 696TB	Up to 1,416TB	Up to 2,136TB	Up to 2,856TB
Device Slots	60	120	180	240
Form Factor (total)	8U	12U	16U	20U
Memory (total)	512GB			
Read Cache	800GB		Up to 1.6TB	
10GbE Ports	4			
Software	NexentaStor 5.x			

Lenovo HGST RA	DX8200N-HG-1x60	DX8200N-HG-2x60	DX8200N-HG-3x60	DX8200N-HG-4x60
Controller	2x Lenovo X3650-M5			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 1TB, 3.5” 7.2K NL SAS			
SAS HBA	1x N2215 for internal boot devices 2x N2226 for external devices			
NIC	1GbE Broadcom, 10GbE Intel X520 DP, or 10GbE Intel X540 DP			
FC HBA (optional)	8Gb Emulex LPe 12000 (Single) or Emulex LPe 12002 (Dual) 8Gb QLogic QLE-2560 (Single) or QLE-2562 (Dual) 16Gb QLogic QLE-2660 (Single) or QLogic QLE-2662 (Dual)			
Storage Enclosure	1x HGST 4U60G2	2x HGST 4U60G2	3x HGST 4U60G2	4x HGST 4U60G2
Data Drive #	Up to 60	Up to 120	Up to 180	Up to 240
Data HDD	HGST Ultrastar 6TB air HDDs HGST Ultrastar 8TB helium HDDs HGST Ultrastar 10TB helium HDDs HGST Ultrastar 12TB helium HDDs			
L2ARC (optional)	800GB SAS SSD (3 DWPD) per pool			
ZIL/SLOG	2x 400GB SAS SSD (10 DWPD) per pool			

Note 1: BIOS for the X3650-M5 servers must be TCE126M. BMC FW version must be TC0018M. X3650-M5 server must be configured with A5FR in Riser 1 and A5R5 in Riser 2.
Note 2: N2226 FW version must be 1.11.02 and NVDATA field in sas3flash-list output must be 0b:00:01:07
Note 3: Use dual SAS path for configurations with up to 4 enclosures.
Note 4: Chassis management for the HGST 4U60G2 enclosure is supported in NexentaStor 5.1 and up.

5 StorMax Reference Architectures

Reference Architectures with the StorMax NX224 controller provide configurations that combine 2 high-availability controllers and storage in a single 2U chassis.

5.1 StorMax All-Flash and Hybrid Configurations

NexentaStor All-Flash configurations deliver very high IOPS and sub millisecond latency for small random IO workloads that are typical of databases, enterprise applications and high performance private cloud (VMware, OpenStack and Hyper–V) environments.

NexentaStor Hybrid configurations deliver great sync write performance and are best suited for mixed read/write workloads with small random IO that are typical of private cloud (VMware, OpenStack and Hyper-V) storage backend, generic file services and high performance backup and archive use cases.

StorMax RA	NX225	NX250
Max Raw Capacity	44TB	92TB
Device Slots	24	
Form Factor (total)	2U	
Memory (total)	512GB	
10GbE Ports	4x SFP+	
Software	NexentaStor 5.x	

StorMax RA	NX225	NX250
Controller	NX224	
CPU	E5-2650 v4 2.2GHz, 12-core, 2-socket	E5-2643 v4 3.4GHz, 6-core, 2-socket
DRAM	256GB (16x 16GB)	
Boot Drive	Intel DC S3510 240GB SATA 2.5 SSD	
SAS HBA	Built-in LSI 3008	
NIC	2x Intel 82599-ES 10GbE SFP+ OCP mezzanine cards	
FC HBA (optional)	Future	
Storage Enclosure	n/a	
Data HDD or SSD	22x 2TB HDD	24x 3.84TB SSD
L2ARC	n/a	
ZIL/SLOG	2x 100GB SAS SSD	n/a

Note 1: Tested motherboard BIOS version 1.00 for StorMax NX224.
Note 2: There is no need for separate ZIL or L2ARC devices in all-SSD configurations.

6 Supermicro Reference Architectures

6.1 Supermicro All-Flash Configurations

NexentaStor All-Flash configurations deliver very high IOPS and sub millisecond latency for small random IO workloads that are typical of databases, enterprise applications and high performance private cloud (VMware, OpenStack and Hyper–V) environments.

6.1.1 Supermicro X10 All-Flash – 24 Bay SC216

Supermicro X10 All-Flash RA	NS-AF-24	NS-AF-48	NS-AF-72	NS-AF-96
Raw Capacity	Up to 92TB	Up to 184TB	Up to 276TB	Up to 368TB
Device Slots	24	48	72	96
Form Factor (total)	6U	8U	10U	12U
Memory (total)	512GB			
10GbE Ports	8			
Software	NexentaStor 5.x			

Supermicro X10 All-Flash RA	NS-AF-24	NS-AF-48	NS-AF-72	NS-AF-96
Controller	2x SYS-6028U-NEX4			
CPU	E5-2643 v3 3.4GHz, 6-core, 2-socket E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)			
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-16e	
NIC	2x AOC-STGN-i2S or AOC-STG-i2T			
FC HBA (optional)	Emulex LPe 12000, LPe 12002, LPe 12004, LPe 16000B, LPe 16002B QLogic QLE 2560, 2562, 2672			
Storage Enclosure	1x 216BE2C-R741JBOD (24-bay)	2x 216BE2C-R741JBOD (24-bay)	3x 216BE2C-R741JBOD (24-bay)	4x 216BE2C-R741JBOD (24-bay)
Flash Device	Up to 3.84TB SSD (See Appendix A for specific options)			
L2ARC	n/a			
ZIL/SLOG	n/a			

Note 1: For Intel v3 CPUs, motherboard BIOS for the SMC X10 RA must be 1.01 or later. For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.

Note 2: There is no need for separate ZIL or L2ARC devices in all-SSD configurations.

Note 3: When deploying All-Flash configurations, ensure that the endurance of the SSDs used in the configuration is aligned with the expected write workload on the system. Best practice is to use SSDs rated from 3 DPWD to 10 DWPD.

6.2 Supermicro Hybrid Configurations

NexentaStor Hybrid configurations deliver great sync write performance and are best suited for mixed read/write workloads with small random IO that are typical of private cloud (VMware, OpenStack and Hyper-V) storage backend, generic file services and high performance backup and archive use cases.

6.2.1 Supermicro X10 Hybrid - 24 Bay SC216

Supermicro 24 Bay RA	NSM-H-2x24-X10
Raw Capacity	Up to 92TB
Device Slots	48
Form Factor (total)	8U
Memory (total)	192GB
Read Cache	400GB
10GbE Ports	4
Software	NexentaStor 5.x

Supermicro RA 24 Bay RA	NSM-H-2x24-X10
Controller	2x SYS-6028U-NEX3
CPU	E5-2609 v3 1.9GHz, 6-core, 2-socket E5-2620 v4 2.1GHz, 8-core, 2-socket
DRAM	96GB (12x 8GB)
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)
SAS HBA	1x AOC-SAS3-9300-8e
NIC	1x AOC-STGN-i2S or AOC-STG-i2T
FC HBA (optional)	Emulex LPe 12000, LPe 12002, LPe 12004, LPe 16000B, LPe 16002B QLogic QLE 2560, 2562, 2672
Storage Enclosure	2x 216BE2C-R741JBOD (24-bay)
Data HDD	2.5” 10K SAS HDD – 1.2 TB 2.5” 10K SAS HDD – 1.8 TB 2.5” 7.2K SAS HDD – 2 TB
Data Drive #	46
L2ARC	n/a
ZIL/SLOG	2x 200GB SSD (25 DWPD)

Note 1: For Intel v3 CPUs, motherboard BIOS for the SMC X10 RA must be 1.01 or later. For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.

6.2.2 Supermicro X10 Hybrid - 44 Bay SC847

Supermicro 44 Bay RA	NSM-H-1x44-X10	NSM-H-2x44-X10	NSM-H-4x44-X10	NSM-H-6x44-X10
Raw Capacity	Up to 168TB	Up to 328TB	Up to 1,700TB	Up to 2,580TB
Device Slots	44	88	176	264
Form Factor (total)	8U	12U	20U	28U
Memory (total)	192GB		512GB	
Read Cache	n/a	800GB		
10GbE Ports	4	8		
Software	NexentaStor 5.x			

Supermicro 44 Bay RA	NSM-H-1x44-X10	NSM-H-2x44-X10	NSM-H-4x44-X10	NSM-H-6x44-X10
Controller	2x SYS-6028U-NEX3		2x SYS-6028U-NEX4	
CPU	E5-2609 v3 1.9GHz, 6-core, 2-socket E5-2620 v4 2.1GHz, 8-core, 2-socket		E5-2643 v3 3.4GHz, 6-core, 2-socket E5-2643 v4 3.4GHz, 6-core, 2-socket	
DRAM	96GB (12x 8GB)		256GB (16x 16GB)	
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)			
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-16e	3x AOC-SAS3-9300-16e
NIC	1x AOC-STGN-i2S or AOC-STG-i2T	2x AOC-STGN-i2S or AOC-STG-i2T		
FC HBA (optional)	Emulex LPe 12000, LPe 12002, LPe 12004, LPe 16000B, LPe 16002B QLogic QLE 2560, 2562, 2672			
Storage Enclosure	1x 847E2C-R1K28JBOD (44-bay)	2x 847E2C-R1K28JBOD (44-bay)	4x 847E2C-R1K28JBOD (44-bay)	6x 847E2C-R1K28JBOD (44-bay)
Data HDD	3.5” 7.2k SAS HDD – 2TB 3.5“ 7.2k SAS HDD – 4TB		3.5” 7.2k SAS HDD – 2TB 3.5“ 7.2k SAS HDD – 4TB 3.5” 7.2k SAS HDD – 6TB 3.5“ 7.2k SAS HDD – 8TB 3.5“ 7.2k SAS HDD – 10TB	
Data Drive #	42	82	170	258
L2ARC	n/a	2x 400GB SSD (3 DWPD)		
ZIL/SLOG	2x 200GB SSD (25 DWPD)	4x 200GB SSD (25 DWPD)		

Note 1: For Intel v3 CPUs, motherboard BIOS for the SMC X10 RA must be 1.01 or later. For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.

6.2.3 Supermicro X10 Hybrid - 60 Bay SC946SE2C

Supermicro 60 Bay RA	NSM-H-1x60-X10	NSM-H-2x60-X10	NSM-H-3x60-X10	NSM-H-4x60-X10
Raw Capacity	Up to 580TB	Up to 1,140TB	Up to 1,740TB	Up to 2,340TB
Device Slots	60	120	180	240
Form Factor (total)	8U	12U	16U	20U
Memory (total)	512GB			
Read Cache	n/a	800GB		
10GbE Ports	8			
Software	NexentaStor 5.x			

Supermicro 60 Bay RA	NSM-H-1x60-X10	NSM-H-2x60-X10	NSM-H-3x60-X10	NSM-H-4x60-X10
Controller	2x SYS-6028U-NEX4			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)			
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-16e	
NIC	2x AOC-STGN-i2S or AOC-STG-i2T			
FC HBA (optional)	Emulex LPe 12000, LPe 12002, LPe 12004, LPe 16000B, LPe 16002B QLogic QLE 2560, 2562, 2672			
Storage Enclosure	1x 946SE2C-R1K66JBOD (60-bay)	2x 946SE2C-R1K66JBOD (60-bay)	3x 946SE2C-R1K66JBOD (60-bay)	4x 946SE2C-R1K66JBOD (60-bay)
Data HDD	3.5” 7.2k SAS HDD – 2TB 3.5“ 7.2k SAS HDD – 4TB 3.5” 7.2k SAS HDD – 6TB 3.5“ 7.2k SAS HDD – 8TB 3.5“ 7.2k SAS HDD – 10TB			
Data Drive #	58	114	174	234
L2ARC	n/a	2x 400GB SSD (3 DWPD)		
ZIL/SLOG	2x 200GB SSD (25 DWPD)	4x 200GB SSD (25 DWPD)		

Note 1: For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.

6.2.4 Supermicro X10 Hybrid – 90 Bay SC946

Supermicro 90 Bay RA	NSM-H-1x90-X10	NSM-H-2x90-X10	NSM-H-3x90-X10	NSM-H-4x90-X10
Raw Capacity	Up to 870TB	Up to 1,740TB	Up to 2,580TB	Up to 3,480TB
Device Slots	90	180	270	360
Form Factor (total)	8U	12U	16U	20U
Memory (total)	512GB			
Read Cache	400GB	800GB		1.6TB
10GbE Ports	8			
Software	NexentaStor 5.x			

Supermicro 90 Bay RA	NSM-H-1x90-X10	NSM-H-2x90-X10	NSM-H-3x90-X10	NSM-H-4x90-X10
Controller	2x SYS-6028U-NEX4			
CPU	E5-2643 v3 3.4GHz, 6-core, 2-socket E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)			
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-16e	
NIC	2x AOC-STGN-i2S or AOC-STG-i2T			
FC HBA (optional)	Emulex LPe 12000, LPe 12002, LPe 12004, LPe 16000B, LPe 16002B QLogic QLE 2560, 2562, 2672			
Storage Enclosure	1x 946ED-R2KJBOD (90-bay)	2x 946ED-R2KJBOD (90-bay)	3x 946ED-R2KJBOD (90-bay)	4x 946ED-R2KJBOD (90-bay)
Data HDD	3.5” 7.2k SAS HDD – 2TB 3.5“ 7.2k SAS HDD – 4TB 3.5” 7.2k SAS HDD – 6TB 3.5“ 7.2k SAS HDD – 8TB 3.5“ 7.2k SAS HDD – 10TB			
Data Drive #	87	174	258	348
L2ARC	1x 400GB SSD (3 DWPD)	2x 400GB SSD (3 DWPD)		4x 400GB SSD (3 DWPD)
ZIL/SLOG	2x 200GB SSD (25 DWPD)	4x 200GB SSD (25 DWPD)		8x 200GB SSD (25 DWPD)

Note 1: For Intel v3 CPUs, motherboard BIOS for the SMC X10 RA must be 1.01 or later. For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.

6.3 Supermicro All-Disk Configurations

NexentaStor All-Disk configurations are best suited for backup and archive type use cases, sequential workloads and read intensive workloads.

6.3.1 Supermicro X10 All-Disk – 44 Bay SC847

Supermicro 44 Bay RA	NSM-D-1x44-X10	NSM-D-2x44-X10	NSM-D-4x44-X10	NSM-D-6x44-X10	NSM-D-8x44-X10
Raw Capacity	Up to 440TB	Up to 880TB	Up to 1,760TB	Up to 2,640TB	Up to 3,520TB
Device Slots	44	88	176	264	352
Form Factor (total)	8U	12U	20U	28U	36U
Memory (total)	512GB				
Read Cache	n/a				
10GbE Ports	8				
Software	NexentaStor 5.x				

Supermicro 44 Bay RA	NSM-D-1x44-X10	NSM-D-2x44-X10	NSM-D-4x44-X10	NSM-D-6x44-X10	NSM-D-8x44-X10
Controller	2x SYS-6028U-NEX4				
CPU	E5-2643 v3 3.4GHz, 6-core, 2-socket E5-2643 v4 3.4GHz, 6-core, 2-socket				
DRAM	256GB (16x 16GB)				
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)				
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-16e	3x AOC-SAS3-9300-16e	4x AOC-SAS3-9300-16e
NIC	2x AOC-STGN-i2S or AOC-STG-i2T				
FC HBA (optional)	Emulex LPe 12000, LPe 12002, LPe 12004, LPe 16000B, LPe 16002B QLogic QLE 2560, 2562, 2672				
Storage Enclosure	1x 847E2C-R1K28JBOD (44-bay)	2x 847E2C-R1K28JBOD (44-bay)	4x 847E2C-R1K28JBOD (44-bay)	6x 847E2C-R1K28JBOD (44-bay)	8x 847E2C-R1K28JBOD (44-bay)
Data HDD	3.5” 7.2k SAS HDD – 2TB 3.5“ 7.2k SAS HDD – 4TB 3.5” 7.2k SAS HDD – 6TB 3.5“ 7.2k SAS HDD – 8TB 3.5“ 7.2k SAS HDD – 10TB				
Data Drive #	44	88	176	264	352
L2ARC	n/a				
ZIL/SLOG	Recommended: 2x 200GB SAS SSD (25 DWPD) per pool				

Note 1: For Intel v3 CPUs, motherboard BIOS for the SMC X10 RA must be 1.01 or later. For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.

6.3.2 Supermicro X10 All-Disk – 60 Bay SC946SE2C

Supermicro 60 Bay RA	NSM-D-1x60-X10	NSM-D-2x60-X10	NSM-D-3x60-X10	NSM-D-4x60-X10
Raw Capacity	Up to 600TB	Up to 1,200TB	Up to 1,800TB	Up to 2,400TB
Device Slots	60	120	180	240
Form Factor (total)	8U	12U	16U	20U
Memory (total)	512GB			
Read Cache	n/a	800GB		
10GbE Ports	8			
Software	NexentaStor 5.x			

Supermicro 60 Bay RA	NSM-D-1x60-X10	NSM-D-2x60-X10	NSM-D-3x60-X10	NSM-D-4x60-X10
Controller	2x SYS-6028U-NEX4			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)			
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-16e	
NIC	2x AOC-STGN-i2S or AOC-STG-i2T			
FC HBA (optional)	Emulex LPe 12000, LPe 12002, LPe 12004, LPe 16000B, LPe 16002B QLogic QLE 2560, 2562, 2672			
Storage Enclosure	1x 946SE2C-R1K66JBOD (60-bay)	2x 946SE2C-R1K66JBOD (60-bay)	3x 946SE2C-R1K66JBOD (60-bay)	4x 946SE2C-R1K66JBOD (60-bay)
Data HDD	3.5” 7.2k SAS HDD – 2TB 3.5“ 7.2k SAS HDD – 4TB 3.5” 7.2k SAS HDD – 6TB 3.5“ 7.2k SAS HDD – 8TB 3.5“ 7.2k SAS HDD – 10TB			
Data Drive #	60	120	180	240
L2ARC	n/a			
ZIL/SLOG	Recommended: 2x 200GB SAS SSD (25 DWPD) per pool			

Note 1: For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.

6.3.3 Supermicro X10 All-Disk – 90 Bay SC946

Supermicro 90 Bay RA	NSM-D-1x90-X10	NSM-D-2x90-X10	NSM-D-4x90-X10	NSM-D-6x90-X10	NSM-D-8x90-X10
Raw Capacity	Up to 900TB	Up to 1,800TB	Up to 3,600TB	Up to 5,400TB	Up to 7,200TB
Device Slots	90	180	360	540	720
Form Factor (total)	8U	12U	20U	28U	36U
Memory (total)	512GB				
Read Cache	n/a				
10GbE Ports	8				
Software	NexentaStor 5.x				

Supermicro 90 Bay RA	NSM-D-1x90-X10	NSM-D-2x90-X10	NSM-D-4x90-X10	NSM-D-6x90-X10	NSM-D-8x90-X10
Controller	2x SYS-6028U-NEX4				
CPU	E5-2643 v3 3.4GHz, 6-core, 2-socket E5-2643 v4 3.4GHz, 6-core, 2-socket				
DRAM	256GB (16x 16GB)				
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)				
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-16e	3x AOC-SAS3-9300-16e	4x AOC-SAS3-9300-16e
NIC	2x AOC-STGN-i2S or AOC-STG-i2T				
FC HBA (optional)	Emulex LPe 12000, LPe 12002, LPe 12004, LPe 16000B, LPe 16002B QLogic QLE 2560, 2562, 2672				
Storage Enclosure	1x 946ED-R2KJBOD (90-bay)	2x 946ED-R2KJBOD (90-bay)	4x 946ED-R2KJBOD (90-bay)	6x 946ED-R2KJBOD (90-bay)	8x 946ED-R2KJBOD (90-bay)
Data HDD	3.5” 7.2k SAS HDD – 2TB 3.5“ 7.2k SAS HDD – 4TB 3.5” 7.2k SAS HDD – 6TB 3.5“ 7.2k SAS HDD – 8TB 3.5“ 7.2k SAS HDD – 10TB				
Data Drive #	90	180	360	540	720
L2ARC	n/a				
ZIL/SLOG	Recommended: 2x 200GB SAS SSD (25 DWPD) per pool				

Note 1: For Intel v3 CPUs, motherboard BIOS for the SMC X10 RA must be 1.01 or later. For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.

6.4 Supermicro and HGST Storage Platform Configurations

6.4.1 Supermicro X10 and HGST 2U24 All-Flash

The following reference architectures are based on the following HGST 2U24 Flash Storage Platforms:

HGST Model Number	Configuration
1ES0107	12x 3.84TB 1 DWPD SAS SSDs
1ES0110	24x 3.84TB 1 DWPD SAS SSDs
1ES0108	12x 7.68TB 1 DWPD SAS SSDs
1ES0111	24x 7.68TB 1 DWPD SAS SSDs

Supermicro and HGST RA	NSH-AF-24	NSH-AF-48	NSH-AF-72	NSH-AF-96
Raw Capacity	Up to 184TB	Up to 368TB	Up to 552TB	Up to 737TB
Device Slots	24	48	72	96
Form Factor (total)	6U	8U	10U	12U
Memory (total)	512GB			
10 GbE Ports	8			
Software	NexentaStor 5.x			

Supermicro and HGST RA	NSH-AF-24	NSH-AF-48	NSH-AF-72	NSH-AF-96
Controller	1x or 2x SYS-6028U-NEX4			
CPU	E5-2643 v4, 3.4GHz, 6-core, 2-socket			
DRAM	256GB per controller			
Boot Drive	2x 1TB SAS 7.2k 3.5” mirrored			
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	3x AOC-SAS3-9300-8e	4x AOC-SAS3-9300-8e
NIC	2x AOC-STGN-i2S or AOC-STG-i2T			
FC HBA (optional)	Emulex LPe 12002, LPe 12004, LPe 16002B QLogic QLE 2562, 2672			
Storage Enclosure	1x HGST 2U24	2x HGST 2U24	3x HGST 2U24	4x HGST 2U24
Data Device #	Up to 24	Up to 48	Up to 72	Up to 96
Flash Device	3.84TB SAS SSD (1 DWPD) 7.68TB SAS SSD (1 DWPD)			
L2ARC	n/a			
ZIL /SLOG	n/a			

Note 1: For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.
Note 2: There is no need for separate ZIL or L2ARC devices in all-SSD configurations.
Note 3: Chassis management for the HGST 2U24 enclosure is targeted for NexentaStor 5.1.1.

6.4.2 Supermicro X10 & HGST 4U60G2 Hybrid / All-Disk

Supermicro HGST RA	NSH-1x60-X10	NSH-2x60-X10	NSH-3x60-X10	NSH-4x60-X10
Raw Capacity	Up to 696TB	Up to 1,416TB	Up to 2,136TB	Up to 2,856TB
Device Slots	60	120	180	240
Form Factor (total)	8U	12U	16U	20U
Memory (total)	512GB			
Read Cache	800GB		Up to 1.6TB	
10GbE Ports	8			
Software	NexentaStor 5.x			

Supermicro HGST RA	NSH-1x60-X10	NSH-2x60-X10	NSH-3x60-X10	NSH-4x60-X10
Controller	2x SYS-6028U-NEX4			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2TB (2x 1TB SAS 7.2k 3.5”)			
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-16e	
NIC	2x AOC-STGN-i2S or AOC-STG-i2T			
FC HBA (optional)	Emulex LPe 12000, LPe 12002, LPe 12004, LPe 16000B, LPe 16002B QLogic QLE 2560, 2562, 2672			
Storage Enclosure	1x HGST 4U60G2	2x HGST 4U60G2	3x HGST 4U60G2	4x HGST 4U60G2
Data Drive #	Up to 60	Up to 120	Up to 180	Up to 240
Data HDD	HGST Ultrastar 6TB air HDDs HGST Ultrastar 8TB helium HDDs HGST Ultrastar 10TB helium HDDs HGST Ultrastar 12TB helium HDDs			
L2ARC (optional)	800GB SAS SSD (3 DWPD) per pool			
ZIL/SLOG	2x 400GB SAS SSD (10 DWPD) per pool			

Note 1: For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.
Note 2: Use dual SAS path for configurations with up to 4 enclosures.
Note 3: Chassis management for the HGST 4U60G2 enclosure is supported in NexentaStor 5.1 and up.

7 Supermicro Unified Storage Appliances

Supermicro Unified Storage Appliances powered by Nexenta (SUSAN) ship from Supermicro pre-configured with NexentaStor 5 software, high-availability controllers and storage pool. They provide all the performance and functionality of NexentaStor 5 in simple to acquire, simple to deploy and simple to manage appliances based on 100% industry standard hardware.

These appliances are available in All-Flash 2U (2 nodes & 24x 2.5" bays) chassis and Hybrid / All-Disk 4U (2 nodes & 24x 3.5" bays) chassis. They can be extended with up to 2 additional SAS connected storage enclosures to meet larger capacity requirements. To further simplify ordering, they are offered in a limited set of pre-defined usable capacity configurations.

For more information, please visit www.supermicro.com.

7.1.1 Supermicro (2U) All-Flash Appliances

These systems deliver high-availability in a single 2U chassis, with 2 nodes and 12 or 24 SSDs in the initial chassis, scaling up to 72 SSDs for a chassis with 2 additional SAS connected enclosures.

Supermicro All-Flash SBB Appliance	**NX2010-AF-15 to NX2020-AF-61**	**NX2030-AF-30 to NX2040-AF-184**
Target Use Case	Low latency, high IOPS workloads Databases, Analytics, Virtual Machines	
Storage Software	NexentaStor 5.x	
Form Factor	Min of 2U, 24 Bay, 2 Nodes, All-in One Chassis	
	Max of 4U (with 1x 2U storage enclosure)	Max of 6U (with 2x 2U storage enclosures)
Storage Controllers	2 Node High-Availability Cluster	
On board 10GbE Ports	2 per Node / 4 per Appliance	
Optional 10GbE Ports	Up to 4 per Node / 8 per Appliance	
Optional 16Gbps Fibre Channel Ports	Up to 4 per Node / 8 per Appliance	
Storage Expansion	Up to one additional SC216 2U 24 Bay enclosure	Up to two additional SC216 2U 24 Bay enclosures
Device Slots	24 to 48	24 to 72
SSD Size	1.92TB (3 DWPD)	3.84TB (3 DWPD)
Data Protection	Dual-Parity	
Min-Max Raw Capacity (TB)	23 to 92 TB	46 to 276 TB
Min-Max Usable Capacity (TB)	15 to 61 TB	30 to 184 TB
Min-Max Usable Capacity (TiB)	14 to 55 TiB	27 to 167 TiB
Min-Max Effective Capacity (TiB)	41 to 166 TiB	82 to 502 TiB

Note 1: TB is $(1000)^4$ Bytes. TiB is $(1024)^4$ Bytes.
Note 2: Effective capacity reflects typical savings of 3:1 from inline data reduction for the workloads supported by this appliance. Actual capacity savings will vary based on customer datasets stored on the appliance.

7.1.2 Supermicro (4U) Hybrid and All-Disk Appliances

These systems deliver high-availability in a single 4U chassis, with 2 nodes and up to 24 devices in the initial 4U chassis, scaling up to large capacity systems in 12U with 2 additional SAS connected enclosures.

Supermicro Hybrid SBB Appliance	NX4010-HM-20 to NX4010-HM-106	NX4020-HR-48 to NX4020-HR-272	NX4030-HA-128 to NX4030-HA-640
Target Use Case	Good performance block and file services Virtual Machines, Home Directories		Low cost, high capacity disk storage Backup Target & Near Line Archive
Storage Software	NexentaStor 5.x		
Form Factor	Min of 4U (24 Bay, 2 Nodes, All-in One Chassis) Max of 12U (Appliance with 2x 4U storage enclosures)		
Storage Controllers	2 Node High-Availability Cluster		
On board 10GbE Ports	2 per Node / 4 per Appliance		
Optional 10GbE Ports	Up to 4 per Node / 8 per Appliance		
Optional 16Gbps Fibre Channel Ports	Up to 4 per Node / 8 per Appliance		
Storage Expansion	Up to two additional SC847E2C-R1K28JBOD 4U 44 Bay enclosures		
Device Slots	24 to 72		
Flash Cache	Yes	Yes	No
HDD Size	2TB	4TB	8TB
Data Protection	Mirror	Dual-Parity	Triple-Parity
Min-Max Raw Capacity (TB)	42 to 218 TB	84 to 420 TB	176 to 880 TB
Min-Max Usable Capacity (TB)	20 to 106 TB	48 to 272 TB	128 to 640 TB
Min-Max Usable Capacity (TiB)	18 to 96 TiB	44 to 247 TiB	116 to 582 TiB
Min-Max Effective Capacity (TiB)	27 to 145 TiB	65 to 371 TiB	140 to 698 TiB

Note 1: TB is $(1000)^4$ Bytes. TiB is $(1024)^4$ Bytes.

Note 2: Effective capacity reflects typical savings from inline data reduction for the workloads supported by this appliance (1.5:1 for the hybrid and 1.2:1 for archive). Actual capacity savings will vary based on customer datasets stored on the appliance.

8 Certified Solutions

8.1 Certified Solutions with NexentaStor 5.x

NexentaStor 5.x is certified on the following partner solutions:

Partner Name	Partner Solutions
Ericsson	• HDS 8000 Compute Sled Unit (CSU 0101 & 0111) • HDS 8000 Storage Sled Unit (SSU 0101 & 0111) • HDS 8000 Compute Rack Unit (CRU 0101) • HDS 8000 Storage Rack Unit (SRU 0101)
Supermicro 24x3.5" Simply Double Server	• Supermicro SSG-6028R-E1CR24L 2U, 24x 3.5" bays, Simply Double singe node with rear 2.5" boot devices Min of 128GB of DRAM Certified with NexentaStor 5.1 and BIOS version 2.0a

8.2 Certified Solution Building Blocks

The following is a list of Certified Solutions building blocks that are certified with NexentaStor 5.x. Certified Solutions based on these building blocks are more likely to pass Nexenta Certification Testing.

Note that whether they are based on building blocks listed below or not, all partner specific Certified Solutions must pass Nexenta Certification Testing before they can be added on the HCL and formally supported.

Certified Solutions Building Blocks - Controllers					
Controller	**CPU**	**DRAM**	**SAS HBA**	**NIC**	**FC HBA**
Supermicro X9DRH-iTF X9DRi-LN4+ X9DR3-LN4+ X9DRW-3LN4F+ X9DRW-3TF+ X9DRD-7LN4F X10DRU-i+ SMC SYS6048U-TR4+(2U) SMC SYS6018U-TR4+(1U) SMC SYS-6048R-NEX1 Cisco C240-M4SX Dell R630 Dell R730	E5-2609v3 E5-2640v3 E5-2643v3 E5-2680v3 E5-2609v4 E5-2620v4 E5-2643v4 E5-2637v4 E5-2640v4	Up to 256GB	LSI 9200-8e LSI 9201-16e LSI 9205-8e LSI 9206-16e LSI 9207-8e LSI 9207-8i LSI-9211-8i LSI-9300-8i LSI-9300-8e LSI-9300-16e AOC-SAS3-9300-8e AOC-SAS3-9300-16e LSI-9305-16e	10GbE: X520 DA/SFP+ X540 RJ45 AOC-STGN-i2S AOC-STG-i2T AOC-STG-i4T Intel X710-T4 Intel X710-DA2 25GbE: Intel XXV710-DA1 Intel XXV710-DA2 40GbE: Intel XL710-QDA1 Intel XL710-QDA2	4Gb: QLE 2460 QLE 2462 8Gb: LPe 12000 LPe 12002 LPe 12004 QLE 2560 QLE 2562 16Gb: LPe 16000B LPe 16002B QLE 2660 QLE 2662 QLE 2670 QLE 2672 ATTO FC-162E ATTO FC-162P 32Gb: ATTO FC-322E

Note 1: See respective partner AVL for supported drive list.

Note 2: SYS-6048R-NEX1 is the 36-bay server from Supermicro that is similar to 6048R-E1CR36L but with 2 SAS expanders.

Note 3: Intel XXV710 support starts with NexentaStor 5.1 and requires MTU 9000.

Certified Solutions Building Blocks - Storage Enclosures	Notes
Dell SC280 (5U 84 bay)	
Dell MD1400 (2U 12 bay)	
Dell MD1420 (2U 24 bay)	
Dell MD3060e (4U 60 bay)	
Dell MD1280 (5U 84 bay)	
HGST 2U24 (2U 24 bay)	Models: 1ES0107, 1ES0110, 1ES0108, 1ES0111 Chassis management supported with 5.1.1 and above
HGST 4U60G1 (4U 60 bay)	Chassis management supported with 5.0.3 and above
HGST 4U60G2 (4U 60 bay)	Chassis management supported with 5.1 and above
SanDisk InfiniFlash 100/150	
Seagate OneStor SP-2584 (5U 84 bay)	
Supermicro 216BE2C-R741JBOD (2U 24 bay)	
Supermicro 847E2C-R1K28JBOD (4U 44 bay)	
Supermicro SC946ED-R2KJBOD (4U 90 bay)	

9 Virtual NAS Configurations

9.1 NexentaStor as a VMware vSphere 6.x Virtual NAS

NexentaStor can be deployed as a Storage Virtual Appliance (SVA) on VMware ESXi 6.0 and above. This can be used to provide simple file services from small ESXi clusters (e.g. hyperconverged VSAN clusters in small / remote offices). It can also be leveraged to support Software-Defined Multi-Tenant file services use cases where each tenant gets a dedicated Virtual NAS appliance connected to tenant specific networks and AD servers.

In these scenarios, the NexentaStor SVA consumes vmdks from a backend VMware Datastore. Data protection is handled by the underlying storage (SAN, NAS or Hyperconverged storage from VSAN, Nutanix and others), and NexentaStor can be leveraged to provide NFS and SMB file services. High-availability is provided by VMware HA.

This use case is depicted below:

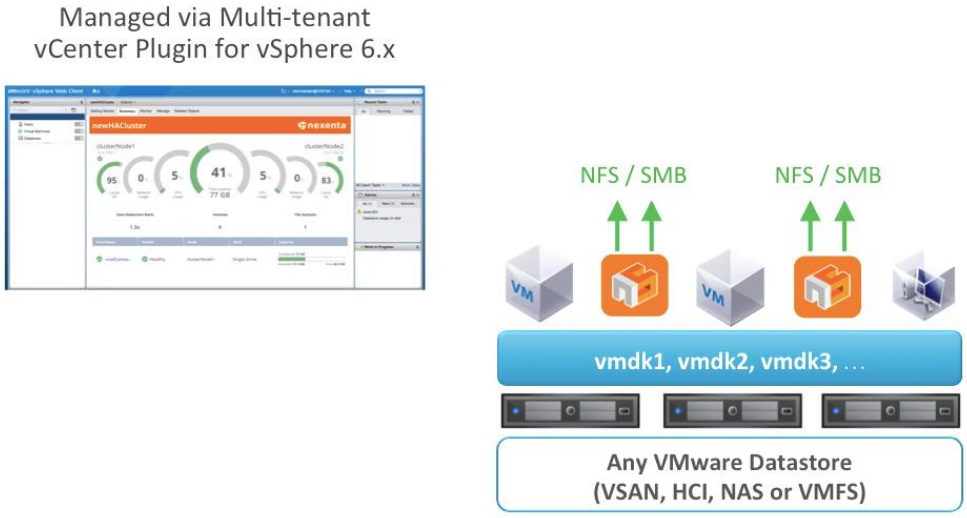

Figure 5-1 *– Two NexentaStor Virtual NAS deployed on VMware ESXi, managed via Multi-tenant vCenter Plugin*

Nexenta supports the following deployment model:

1) NexentaStor 5.x on VMware ESXi 6.0 or later
2) Solaris 11 x64 Virtual Machine with a minimum of 2 vCPUs and 16GB of DRAM
3) Single VM NexentaStor 5 instance consumes vmdks for rpool and data devices. Assuming that the underlying storage supporting the ESXi Datastore is responsible for data protection, the simplest configuration is for NexentaStor to simply stripe across a few data vmdks.
4) More advanced RAIDz data pool configurations can also be used to take advantage of NexentaStor's own data integrity protection. A common option is to configure the pool with (4+1) vdevs across multiple vmdks.

Note that NexentaStor 5 includes open-vm-tools by default.

Note: The default e1000 and VMxnet3 drivers are supported and included in NexentaStor for network interface controllers. LSI Logic Parallel driver needs to be used to create VMDKs.

10 MetroHA Configurations

NexentaStor MetroHA delivers continuous availability, synchronous mirroring and zero RPO disaster recovery for business critical applications. The solution can be deployed between sites connected via a stretched Fibre Channel SAN on the same campus or in the same metro area, over distances up to 50 miles / 80 km.

Functionally, NexentaStor MetroHA stretches a NexentaStor HA cluster across 2 sites, with one NexentaStor head node in each site. SAS backend storage enclosures in both sites are connected using high performance ATTO Technology XstreamCORE FC 75xx Controllers to a shared stretched Fibre Channel Fabric. The NexentaStor software manages this Fibre Channel backend storage and synchronously mirrors data across both sites to ensure zero data loss in the event of a device, node or site failure.

Requirements

- 2 sites connected via a stretched Fibre Channel fabric over distances not exceeding 50 miles / 80 km[1]
- 2 NexentaStor nodes running NexentaStor 5.1 or later, one per site
- 2x or 4x ATTO XstreamCORE FC 75xx controllers (or FibreBridge 6500[2] with firmware version 1.18 or newer).
- Fibre Channel switched fabric between the NexentaStor heads and ATTO controllers
- Storage pools configured as 4-way mirrors
    - NexentaStor 5 SmartSparing allows hot spares to be configured as long as each storage enclosure contains at least one spare per pool.
- Storage enclosures supported in this HCL are supported in MetroHA configurations

The NexentaStor MetroHA solution with 4x ATTO XstreamCORE FC 75xx controllers can scale to large numbers of storage enclosures in each site, simply scaling up to 240 devices per site.

Note 1: Configurations beyond 10km stretches may require additional FC switch feature/capacity licenses to be purchased from switch vendors for additional buffer credits.

Note 2: The ATTO FibreBridge 6500 uses QSFP (SFF-8436) connectors. ATTO includes cables for connecting the FibreBridge 6500 to external mini-SAS (SFF-8088) ports. If you plan to use the ATTO FibreBridge with 12 Gb/s SAS enclosures, you must obtain separate SFF-8436-to-mini-SAS HD (SFF-8644) cables. Nexenta does not support fanout cables with the FibreBridge 6500.

High Level Topologies:

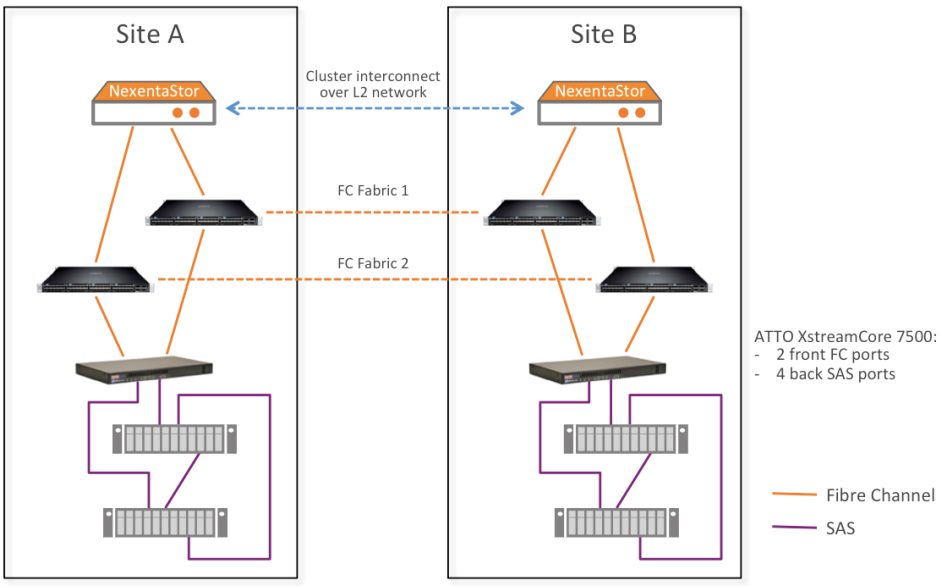

Figure 10-1 – *Typical NexentaStor MetroHA Deployment with 2x ATTO XstreamCORE FC 7500*

And

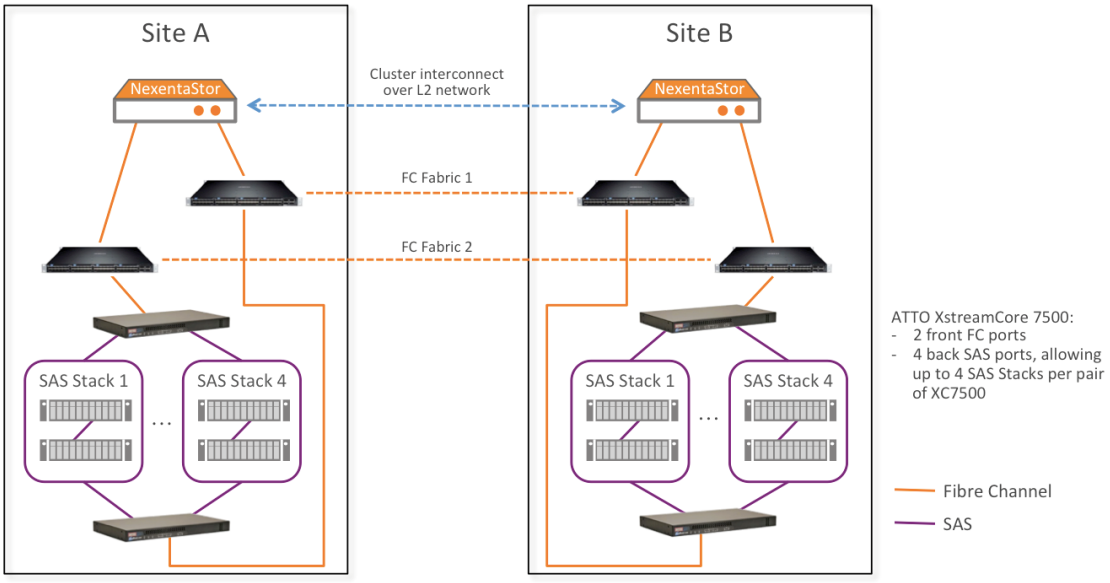

Figure 10-2 – *Typical NexentaStor MetroHA Deployment with 4x ATTO XstreamCORE FC 7500*

See NexentaStor 5 MetroHA User Guide and ATTO XstreamCORE FC 7500 documentation and best practices for more details.

11 Key Management for Data At Rest Encryption

NexentaStor 5.1 and above support data at rest encryption on hardware configurations built with “TCG Enterprise” Self-Encrypting Drives for SLOG, L2ARC and Data devices. As noted in previous sections of this document, such configurations can be All-Flash, Hybrid and All-Disk from Cisco, Dell, Lenovo, Supermicro and others.

Data at rest encryption configurations require an external KMIP compliant key management infrastructure to generate, store and protect the Authentication Keys (AK) that are used to unlock SEDs at boot time.
At this time, NexentaStor has been certified to work with:

- SafeNet KeySecure from Gemalto, physical and virtual editions.

More information on configuring and managing a NexentaStor system for data at rest encryption is available in the ***NexentaStor 5.1 Data At Rest Encryption with SED Configuration Guide*** on nexenta.com.

12 About Nexenta

Nexenta is the global leader in Open Source-driven Software-Defined Storage (OpenSDS). Founded in 2005 with 6,000+ customers and more than 1,500 petabytes of storage under management, our privately held company delivers **100% Software**-based storage solutions, providing organizations with **Total Freedom** to choose an easy-to-use, secure and ultra-low cost storage solution to fit their needs. Nexenta enables everyday apps; from the Internet of Things to Big Data; from OpenStack to Containers – and all types of Clouds – Private, Public, and Hybrid. Founded around an open source platform and industry-disrupting vision, Nexenta delivers its award- and patent-winning software-only unified storage management solutions 24x7 - around the globe - service and support. Nexenta has an **All Love** approach with its global partner network, including solution integration with top hardware partners to deliver validated and certified OpenSDS solutions to fit your business requirements.

For more information, visit www.nexenta.com, Twitter, Facebook, LinkedIn and YouTube.

Appendix A: Supported SSDs

The following table lists SSDs that have been specifically tested by Nexenta and identifies recommended use cases for each. In general, SSDs with higher write endurance and lower sequential write latency should be used for ZIL/SLOG. SSDs with higher capacity and lower cost / performance profiles should be used for L2ARC.

This information is provided to help select devices as part of Certified Solutions or RA configurations that provide flexibility for SSD selection. Note that SSDs used as part of any configuration must also be supported by the enclosure vendor. For example, an SSD used in a Supermicro RA+ configuration should be listed in this Appendix and on Supermicro's list of qualified devices.

Nexenta Use Case	Manufacturer	Model	Interface	Capacity as Sold	Form Factor	Part Number	Min. Firmware
ZIL/SLOG	HGST	UltraStar SSD800MH	12G SAS	200GB	2.5"	HUSMH8020ASS200	A210
ZIL/SLOG	HGST	UltraStar SSD800MH	12G SAS	400GB	2.5"	HUSMH8040ASS200	A210
ZIL/SLOG	HGST	UltraStar SSD800MH	12G SAS	800GB	2.5"	HUSMH8080ASS200	A210
ZIL/SLOG	HGST	UltraStar SSD800MH.B	12G SAS	100GB	2.5"	HUSMH8010BSS200	A45C
ZIL/SLOG	HGST	UltraStar SSD800MH.B	12G SAS	200GB	2.5"	HUSMH8020BSS200	A45C
ZIL/SLOG	HGST	UltraStar SSD800MH.B	12G SAS	400GB	2.5"	HUSMH8040BSS200	A45C
ZIL/SLOG	HGST	UltraStar SSD800MH.B	12G SAS	800GB	2.5"	HUSMH8080BSS200	A45C
ZIL/SLOG	Micron	S655DC	12G SAS	200GB	2.5"	MTFDJAK200MBW	M013
ZIL/SLOG	Micron	S655DC	12G SAS	400GB	2.5"	MTFDJAK400MBW	M013
ZIL/SLOG	SanDisk	Optimus.2 Extreme	6G SAS	100GB	2.5"	SDLKOE9W100G5CA1	F6C2
ZIL/SLOG	SanDisk	Optimus.2 Extreme	6G SAS	200GB	2.5"	SDLKOD9W200G5CA1	F6C2
ZIL/SLOG	SanDisk	Optimus.2 Extreme	6G SAS	400GB	2.5"	SDLKOC9W400G5CA1	F6C2
ZIL/SLOG	SanDisk	Optimus.2 Extreme	6G SAS	800GB	2.5"	SDLLOC9W800G5CA1	F6C2
ZIL/SLOG	SanDisk	Optimus.2 Ultra	6G SAS	150GB	2.5"	SDLKOEGW150G5CA1	F6C2
ZIL/SLOG	SanDisk	Optimus.2 Ultra	6G SAS	300GB	2.5"	SDLKODGW300G5CA1	F6C2
ZIL/SLOG	SanDisk	Optimus.2 Ultra	6G SAS	600GB	2.5"	SDLKOCGW600G5CA1	F6C2
ZIL/SLOG	Seagate	1200	12G SAS	100GB	2.5"	ST100FM0103	0004
ZIL/SLOG	Seagate	1200	12G SAS	200GB	2.5"	ST200FM0103	0004
ZIL/SLOG	Seagate	1200	12G SAS	400GB	2.5"	ST400FM0103	0004
ZIL/SLOG	Seagate	1200	12G SAS	100GB	2.5"	ST100FM0093	0004
ZIL/SLOG	Seagate	1200	12G SAS	200GB	2.5"	ST200FM0093	0004
ZIL/SLOG	Seagate	1200	12G SAS	400GB	2.5"	ST400FM0093	0004
ZIL/SLOG	Seagate	1200.2	12G SAS	200GB	2.5"	ST200FM0133	0004
ZIL/SLOG	Seagate	1200.2	12G SAS	200GB	2.5"	ST200FM0143	0004
ZIL/SLOG	Seagate	1200.2	12G SAS	400GB	2.5"	ST400FM0323	B003
ZIL/SLOG	Seagate	1200.2	12G SAS	400GB	2.5"	ST400FM0333	0004
ZIL/SLOG	Toshiba	PX04SH	12G SAS	400GB	2.5"	PX04SHB040	0104
ZIL/SLOG	Toshiba	PX04SMB	12G SAS	800GB	2.5"	PX04SMB080	0104
L2ARC	HGST	UltraStar SSD1600MR	12G SAS[1]	250GB	2.5"	HUSMR1625ASS200	A100
L2ARC	HGST	UltraStar SSD1600MR	12G SAS[1]	400GB	2.5"	HUSMR1640ASS200	A100
L2ARC	HGST	UltraStar SSD1600MR	12G SAS[1]	500GB	2.5"	HUSMR1650ASS200	A100
L2ARC	HGST	UltraStar SSD1600MR	12G SAS[1]	800GB	2.5"	HUSMR1680ASS200	A100
L2ARC	HGST	UltraStar SSD1600MR	12G SAS[1]	1000GB	2.5"	HUSMR1610ASS200	A100
L2ARC	HGST	UltraStar SSD1600MR	12G SAS[1]	1600GB	2.5"	HUSMR1616ASS200[2]	A100
L2ARC	HGST	UltraStar SSD1600MR	12G SAS	1920GB	2.5"	HUSMR1619ASS230	A100
L2ARC	Micron	S630DC	12G SAS	400GB	2.5"	MTFDJAK400MBT	M013
L2ARC	Micron	S630DC	12G SAS	480GB	2.5"	MTFDJAK480MBT	M013

Nexenta Use Case	Manufacturer	Model	Interface	Capacity as Sold	Form Factor	Part Number	Min. Firmware
L2ARC	Micron	S650DC	12G SAS	400GB	2.5”	MTFDJAK400MBS	M013
L2ARC	Micron	S655DC	12G SAS	200GB	2.5"	MTFDJAK200MBW	M013
L2ARC	Micron	S655DC	12G SAS	400GB	2.5"	MTFDJAK400MBW	M013
L2ARC	SanDisk	Optimus.2 Ascend	6G SAS	200GB	2.5"	SDLKOEDM200G5CA1	F6C2
L2ARC	SanDisk	Optimus.2 Ascend	6G SAS	400GB	2.5"	SDLKODDM400G5CA1	F6C2
L2ARC	SanDisk	Optimus.2 Eco	6G SAS	400GB	2.5"	SDLKOD6R400G5CA1	K0A0
L2ARC	SanDisk	Optimus.2 Ascend	6G SAS	800GB	2.5"	SDLKOCDM800G5CA1	F6C2
L2ARC	SanDisk	Optimus.2 Eco	6G SAS	800GB	2.5"	SDLKOC6R800G5CA1	K0A0
L2ARC	Seagate	1200	12G SAS	200GB	2.5"	ST200FM0053	0004
L2ARC	Seagate	1200	12G SAS	400GB	2.5"	ST400FM0053	0004
L2ARC	Seagate	1200	12G SAS	800GB	2.5"	ST800FM0043	0004
L2ARC	Seagate	1200	12G SAS	200GB	2.5"	ST200FM0073	0004
L2ARC	Seagate	1200	12G SAS	400GB	2.5"	ST400FM0073	0004
L2ARC	Seagate	1200	12G SAS	800GB	2.5"	ST800FM0053	0004
L2ARC	Seagate	1200.2	12G SAS	400GB	2.5"	ST200FM0133	0004
L2ARC	Seagate	1200.2	12G SAS	400GB	2.5"	ST400FM0303	0004
L2ARC	Seagate	1200.2	12G SAS	400GB	2.5"	ST400FM0343	0004
L2ARC	Toshiba	PX04SVB	12G SAS	960GB	2.5"	PX04SVB096	0104
GP DD[1]	HGST	UltraStar SSD800MH.B	12G SAS	800GB	2.5"	HUSMM1680ASS204	A45C
GP DD[1]	HGST	UltraStar SSD1600MR	12G SAS	1.6TB	2.5"	HUSMR1616ASS200	A100
GP DD[1]	HGST	UltraStar SS200	12G SAS	3.2TB	2.5"	SDLL1MLR-032T-CCA1[2]	Y130
GP DD[1]	HGST	UltraStar SS200	12G SAS	3.2TB	2.5"	SDLL1MLR-032T-CAA1[2]	Y130
GP DD[1]	HGST	UltraStar SS200	12G SAS	3.2TB	2.5"	SDLL1MLR-032T-CDA1[2]	Y130
GP DD[1]	HGST	UltraStar SS200	12G SAS	3.84TB	2.5"	SDLL1MLR-038T-CCA1[2]	Y130
GP DD[1]	HGST	UltraStar SS200	12G SAS	3.84TB	2.5"	SDLL1MLR-038T-CAA1[2]	Y130
GP DD[1]	HGST	UltraStar SS200	12G SAS	3.84TB	2.5"	SDLL1MLR-038T-CDA1[2]	Y130
GP DD[1]	HGST	UltraStar SS200	12G SAS	7.68TB	2.5"	SDLL1HLR-076T-CCA1[2]	Y130
GP DD[1]	HGST	UltraStar SS200	12G SAS	7.68TB	2.5"	SDLL1HLR-076T-CAA1[2]	Y130
GP DD[1]	HGST	UltraStar SS200	12G SAS	7.68TB	2.5"	SDLL1HLR-076T-CDA1[2]	Y130
GP DD[1]	Micron	S610DC	12G SAS	1.92TB	2.5"	MTFDJAL1T9MBU	M013
GP DD[1]	Micron	S610DC	12G SAS	3.84TB	2.5"	MTFDJAL3T8MBU	M013
GP DD[1]	Micron	S630DC	12G SAS	800GB	2.5"	MTFDJAK800MBT	M013
GP DD[1]	Micron	S630DC	12G SAS	960GB	2.5"	MTFDJAK960MBT	M013
GP DD[1]	Micron	S630DC	12G SAS	1.6TB	2.5"	MTFDJAL1T6MBT	M013
GP DD[1]	Micron	S630DC	12G SAS	1.92TB	2.5"	MTFDJAL1T9MBT	M013
GP DD[1]	Micron	S630DC	12G SAS	3.2TB	2.5"	MTFDJAL3T2MBT	M013
GP DD[1]	Micron	S630DC	12G SAS	3.84TB	2.5"	MTFDJAL3T8MBT	M013
GP DD[1]	Micron	S650DC	12G SAS	800GB	2.5"	MTFDJAK800MBS	M013
GP DD[1]	Micron	S650DC	12G SAS	1.6TB	2.5"	MTFDJAL1T6MBS	M013
GP DD[1]	Micron	S650DC	12G SAS	3.2TB	2.5"	MTFDJAL3T2MBS[2]	M013
GP DD[1]	SanDisk	InfiniFlash IF100 BSSD	6G SAS	8TB	-	SDIFC10-0720801[2]	593L
GP DD[1]	SanDisk	InfiniFlash IF150 BSSD	12G SAS	4TB	-	SDIFC11-2Y04	62HQ
GP DD[1]	SanDisk	InfiniFlash IF150 BSSD	12G SAS	8TB	-	SDIFC10-0720801[2]	62EL
GP DD[1]	SanDisk	Optimus.2 Ascend	6G SAS	800GB	2.5"	SDLKOCDM800G5CA1	F6C2
GP DD[1]	SanDisk	Optimus.2 Eco	6G SAS	800GB	2.5"	SDLKOC6R800G5CA1	K0A0
GP DD[1]	SanDisk	Optimus.2 Ultra	6G SAS	1.2TB	2.5"	SDLLOCGW012T5CA1	F6C2
GP DD[1]	SanDisk	Optimus.2 Ascend	6G SAS	1.6TB	2.5"	SDLLOCDM016T5CA1	F6C2

Nexenta Use Case	Manufacturer	Model	Interface	Capacity as Sold	Form Factor	Part Number	Min. Firmware
GP DD[1]	SanDisk	Optimus.2 Eco	6G SAS	1.6TB	2.5"	SDLLOC6R016T5CA1	K0A0
GP DD[1]	SanDisk	Optimus.2 Eco	6G SAS	2TB	2.5"	SDLLOC6R020T5CA1	K0A0
GP DD[1]	SanDisk	Optimus Eco	6G SAS	2TB	2.5"	SDLLOCDR020T5CA1[2]	F820
GP DD[1]	SanDisk	Optimus Max	6G SAS	4TB	2.5"	SDLLOCDR038T5CA1[2]	AM70
GP DD[1]	Seagate	1200	12G SAS	100GB - 800GB	2.5"	See SLOG and L2ARC sections above for PNs and firmware info	GP DD
GP DD[1]	Seagate	1200.2	12G SAS	400GB	2.5"	ST400FM0303	0004
GP DD[1]	Seagate	1200.2	12G SAS	400GB	2.5"	ST400FM0343	0004
GP DD[1]	Seagate	1200.2	12G SAS	400GB	2.5"	ST400FM0233	0004
GP DD[1]	Seagate	1200.2	12G SAS	400GB	2.5"	ST400FM0243	0004
GP DD[1]	Seagate	1200.2	12G SAS	400GB	2.5"	ST400FM0293	0004
GP DD[1]	Seagate	1200.2	12G SAS	480GB	2.5"	ST480FM0003	0004
GP DD[1]	Seagate	1200.2	12G SAS	480GB	2.5"	ST480FM0013	0004
GP DD[1]	Seagate	1200.2	12G SAS	800GB	2.5"	ST800FM0233	0004
GP DD[1]	Seagate	1200.2	12G SAS	800GB	2.5"	ST800FM0243	0004
GP DD[1]	Seagate	1200.2	12G SAS	800GB	2.5"	ST800FM0173	0004
GP DD[1]	Seagate	1200.2	12G SAS	800GB	2.5"	ST800FM0183	0004
GP DD[1]	Seagate	1200.2	12G SAS	800GB	2.5"	ST800FM0213	0004
GP DD[1]	Seagate	1200.2	12G SAS	960GB	2.5"	ST960FM0003	0004
GP DD[1]	Seagate	1200.2	12G SAS	960GB	2.5"	ST960FM0013	0004
GP DD[1]	Seagate	1200.2	12G SAS	1.6TB	2.5"	ST1600FM0073	0004
GP DD[1]	Seagate	1200.2	12G SAS	1.6TB	2.5"	ST1600FM0083	0004
GP DD[1]	Seagate	1200.2	12G SAS	1.6TB	2.5"	ST1600FM0003	0004
GP DD[1]	Seagate	1200.2	12G SAS	1.6TB	2.5"	ST1600FM0013	0004
GP DD[1]	Seagate	1200.2	12G SAS	1.6TB	2.5"	ST1600FM0023	0004
GP DD[1]	Seagate	1200.2	12G SAS	1.92TB	2.5"	ST1920FM0003	0004
GP DD[1]	Seagate	1200.2	12G SAS	1.92TB	2.5"	ST1920FM0023	0004
GP DD[1]	Seagate	1200.2	12G SAS	3.2TB	2.5"	ST3200FM0063[2]	0004
GP DD[1]	Seagate	1200.2	12G SAS	3.2TB	2.5"	ST3200FM0003[2]	0004
GP DD[1]	Seagate	1200.2	12G SAS	3.2TB	2.5"	ST3200FM0023[2]	0004
GP DD[1]	Seagate	1200.2	12G SAS	3.2TB	2.5"	ST3200FM0033[2]	0004
GP DD[1]	Seagate	1200.2	12G SAS	3.2TB	2.5"	ST3200FM0043[2]	0004
GP DD[1]	Seagate	1200.2	12G SAS	3.84TB	2.5"	ST3840FM0003[2]	0004
GP DD[1]	Seagate	1200.2	12G SAS	3.84TB	2.5"	ST3840FM0023[2]	0004

Note 1: General Purpose Data Drives (GPDD). We strongly encourage our customers to fully understand the workloads that they will place on the SSDs they choose for general purpose data drives due to the nature of the SSDs themselves. Choosing the wrong SSD for your workload can cause reduced performance and/or reduced longevity of the SSDs in the deployed solution. SSDs have a finite number of program/erase cycles and each is rated for a specific number of FDWD (full drive writes per day). Please work with your Nexenta SE and HW vendor sales representative to select the correct SSD type for your intended deployment.

Note 2: For capacity-based solutions and not performance-based solutions.

Appendix B: Legacy Configurations

This section documents legacy configurations: configurations that continue to be supported even though they are no longer the preferred solutions for new deployments.

B.1 Cisco Legacy Configurations

B.1.1 Cisco C240 and SanDisk InfiniFlash All-Flash

Cisco and SanDisk RA	NCIF-AF-512	NCIF-AF-1024	NCIF-AF-1536	NCIF-AF-2048
Raw Capacity	Up to 512TB	Up to 1024TB	Up to 1536TB	Up to 2048TB
Device Slots	64	128	192	256
Form Factor (HA)	7U	10U	13U	16U
Memory (HA)	512GB			
10GbE Ports	4			
Software	NexentaStor 5.x			

Cisco and SanDisk RA	NCIF-AF-512	NCIF-AF-1024	NCIF-AF-1536	NCIF-AF-2048
Controller	1x or 2x C240 M4SX			
CPU	E5-2680 v3 2.5GHz, 12 cores, 2 socket E5-2643 v4 3.4GHz, 6 cores, 2 socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 480GB internal SSD			
SAS HBA (external)	1x Cisco 9300-8e 12Gb SAS	2x Cisco 9300-8e 12Gb SAS	3x Cisco 9300-8e 12Gb SAS	4x Cisco 9300-8e 12Gb SAS
NIC	Intel X520 10GbE Dual Port SFP+ Intel X540 10GbE Dual Port Base T			
FC HBA	Emulex LPe 12002, LPe 16002-MC QLogic QLE 2562. QLE 2672			
Storage Enclosure	1x InfiniFlash IF150	2x InfiniFlash IF150	3x InfiniFlash IF150	4x InfiniFlash IF150
Data Device #	Up to 64	Up to 128	Up to 192	Up to 256
Flash Device	4TB or 8TB Flash Module			
L2ARC	n/a			
ZIL /SLOG	n/a			

Note 1: BIOS version for Cisco C240 M4SX is C240M4.2.0.6a.0.051220151501 or later.
Note 2: SanDisk InfiniFlash IF150 SAS controller firmware version is A01E or later. See supported general purpose BSSDs in Appendix A.
Note 3: SAS cabling between the NexentaStor node and the InfiniFlash IF150 enclosure should follow IF150 A.2 cabling topology where each NexentaStor node is connected to a single SAS controller on the IF150.
Note 4: There is no need for separate ZIL or L2ARC devices in all-SSD configurations. Nexenta requires a minimum of 128TB of raw flash for NexentaStor and SanDisk IF150 configurations deployed in production environments.

B.2 Dell Legacy Configurations

B.2.1 Dell R730 and SanDisk InfiniFlash All-Flash

Dell and InfiniFlash RA	NDIF-AF-512	NDIF-AF- 1024	NDIF-AF-1536	NDIF-AF-2048
Raw Capacity	Up to 512TB	Up to 1,024TB	Up to 1,536TB	Up to 2,048TB
Device Slots	64	128	192	256
Form Factor (HA)	7U	10U	13U	16U
Memory (HA)	512GB			
10GbE Ports	8			
Software	NexentaStor 5.x			

Dell and InfiniFlash RA	NDIF-AF-512	NDIF-AF-1024	NDIF-AF-1536	NDIF-AF-2048
Controller	1x or 2x R730 PN: 210-AEZO			
CPU	E5-2643 v3, 3.4GHz, 6-core, 2-socket E5-2643 v4, 3.4GHz, 6-core, 2-socket			
DRAM	256GB per controller			
Boot Drive	2x 1TB SAS 7.2k 3.5” mirrored			
SAS HBA	1x Dell SAS 12Gb HBA	2x Dell SAS 12Gb HBA	3x Dell SAS 12Gb HBA	4x Dell SAS 12Gb HBA
	H730 (for internal SysPool drives only)			
NIC	1x Network Daughter Card: Intel i350 DP + Intel X520 DP SFP+ or X540 DP 10GbE RJ45 and 1x Intel X520 10GbE SFP+ or X540 10GbE RJ45			
FC HBA (optional)	Emulex LPe 12002, LPe 16002B QLogic QLE 2562, QLE 2662			
Storage Enclosure	1x InfiniFlash IF150	2x InfiniFlash IF150	3x InfiniFlash IF150	4x InfiniFlash IF150
Total Device #	Up to 64	Up to 128	Up to 192	Up to 256
Flash Device	4TB or 8TB Flash Module			
L2ARC	n/a			
ZIL /SLOG	n/a			

Note 1: BIOS R730 system with Intel v3 CPU should be 1.0.4 and above. BIOS for R730 system with Intel v4 CPU is 2.0.2 or later.
Note 2: SanDisk InfiniFlash IF150 SAS controller firmware version is A01E or later. See supported general purpose BSSDs in Appendix A.
Note 3: SAS cabling between the NexentaStor node and the InfiniFlash IF150 enclosure should follow IF150 A.2 cabling topology where each NexentaStor node is connected to a single SAS controller on the IF150.
Note 4: There is no need for separate ZIL or L2ARC devices in all-SSD configurations. Nexenta requires a minimum of 128TB of raw flash for NexentaStor and SanDisk IF150 configurations deployed in production environments.

B.3 Lenovo Legacy Configurations

B.3.1 Lenovo X3650-M5 and SanDisk InfiniFlash All-Flash

Lenovo and InfiniFlash RA	NLIF-AF-512	NLIF-AF- 1024	NLIF-AF-1536	NLIF-AF-2048
Raw Capacity	Up to 512TB	Up to 1,024TB	Up to 1,536TB	Up to 2,048TB
Device Slots	64	128	192	256
Form Factor (total)	7U	10U	13U	16U
Memory (total)	512GB			
10GbE Ports	8			
Software	NexentaStor 5.x			

Lenovo and InfiniFlash RA	NLIF-AF-512	NLIF-AF-1024	NLIF-AF-1536	NLIF-AF-2048
Controller	2x Lenovo X3650-M5			
CPU	E5-2643 v4 3.4GHz, 6-core, 2-socket			
DRAM	256GB (16x 16GB)			
Boot Drive	2x 1TB, 3.5” 7.2K NL SAS			
SAS HBA	1x N2215 for internal boot devices 2x N2226 for external devices			
NIC	1GbE Broadcom, 2x 10GbE Intel X520 DP, or 10GbE Intel X540 DP			
FC HBA (optional)	8Gb Emulex LPe 12000 (Single) or Emulex LPe 12002 (Dual) 8Gb QLogic QLE-2560 (Single) or QLE-2562 (Dual) 16Gb QLogic QLE-2660 (Single) or QLogic QLE-2662 (Dual)			
Storage Enclosure	1x InfiniFlash IF150	2x InfiniFlash IF150	3x InfiniFlash IF150	4x InfiniFlash IF150
Total Device #	Up to 64	Up to 128	Up to 192	Up to 256
Flash Device	4TB or 8TB Flash Module			
L2ARC	n/a			
ZIL /SLOG	n/a			

Note 1: BIOS for the X3650-M5 servers must be TCE126M. BMC FW version must be TC0018M. X3650-M5 server must be configured with A5FR in Riser 1 and A5R5 in Riser 2.
Note 2: N2226 FW version must be 1.11.02 and NVDATA field in sas3flash-list output must be 0b:00:01:07
Note 3: SanDisk InfiniFlash IF150 SAS controller firmware version is A01E or later. See supported general purpose BSSDs in Appendix A.
Note 4: SAS cabling between the NexentaStor node and the InfiniFlash IF150 enclosure should follow IF150 A.2 cabling topology where each NexentaStor node is connected to a single SAS controller on the IF150.
Note 5: There is no need for separate ZIL or L2ARC devices in all-SSD configurations. Nexenta requires a minimum of 128TB of raw flash for NexentaStor and SanDisk IF150 configurations deployed in production environments.

B.4 Supermicro Legacy Configurations

B.4.1 Supermicro X10 and SanDisk InfiniFlash IF150 All-Flash

The following SanDisk InfiniFlash based reference architectures deliver full featured, all flash configurations that can pack up to 2PB of raw capacity in as little as 16U and 3,000W of power.

Supermicro and SanDisk RA	NSS-AF-512	NSS-AF-1024	NSS-AF-1536	NSS-AF-2048
Raw Capacity	Up to 512TB	Up to 1,024TB	Up to 1,536TB	Up to 2,048TB
Device Slots	64	128	192	256
Form Factor (total)	7U	10U	13U	16U
Memory (total)	512GB			
10 GbE Ports	8			
Software	NexentaStor 5.x			

Supermicro and SanDisk RA	NSS-AF-512	NSS-AF-1024	NSS-AF-1536	NSS-AF-2048
Controller	1x or 2x SYS-6028U-NEX4			
CPU	E5-2643 v3, 3.4GHz, 6-core, 2-socket E5-2643 v4, 3.4GHz, 6-core, 2-socket			
DRAM	256GB per controller			
Boot Drive	2x 1TB SAS 7.2k 3.5” mirrored			
SAS HBA	1x AOC-SAS3-9300-8e	2x AOC-SAS3-9300-8e	3x AOC-SAS3-9300-8e	4x AOC-SAS3-9300-8e
NIC	2x AOC-STGN-i2S or AOC-STG-i2T			
FC HBA (optional)	Emulex LPe 12002, LPe 12004, LPe 16002B QLogic QLE 2562, 2672			
Storage Enclosure	1x InfiniFlash IF150	2x InfiniFlash IF150	3x InfiniFlash IF150	4x InfiniFlash IF150
Data Device #	64	128	192	256
Flash Device	4TB or 8TB Flash Module			
L2ARC	n/a			
ZIL /SLOG	n/a			

Note 1: For Intel v3 CPUs, motherboard BIOS for the SMC X10 RA must be 1.01 or later. For Intel v4 CPUs, motherboard BIOS must be 2.0 or later.

Note 2: SanDisk InfiniFlash IF150 SAS controller firmware version is A01E or later. See supported general purpose BSSDs in Appendix A.

Note 3: SAS cabling between the NexentaStor node and the InfiniFlash IF150 enclosure should follow IF150 A.2 cabling topology where each NexentaStor node is connected to a single SAS controller on the IF150.

Note 4: There is no need for separate ZIL or L2ARC devices in all-SSD configurations. Nexenta requires a minimum of 128TB of raw flash for NexentaStor and SanDisk IF150 configurations deployed in production environments.