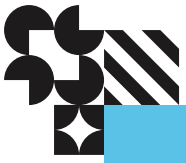

Product Specification Document

HGST Active Archive System SA-7000

September 2015

1ET0037

Revision 1.1

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One MB is equal to one million bytes, one GB is equal to one billion bytes, one TB equals 1,000GB (one trillion bytes) and one PB equals 1,000TB when referring to storage capacity. Usable capacity will vary from the raw capacity due to object storage methodologies and other factors.

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1 Document Summary

Topics:

- Scope
- References
- Physical Dimensions

The following chapter defines the *scope*, *intended audience*, and *references* related to the *HGST Active Archive System FRU Replacement Guide*.

1.1 Scope

When there are hardware failures, it is often not necessary to replace a complete server. This document provides instructions for replacing parts of a server. It distinguishes between between Customer Replaceable Units (CRU) and Field Replaceable Units (FRU): a CRU is a unit which can be replaced by the customer; a FRU is a unit which must be replaced by a vendor field engineer.

The intent of the HGST Active Archive System is to keep serviceability simple while minimizing customer downtime, system degradation, and time needed to make the replacement.

Tip: If you disconnect Ethernet or power cables during the replacement of CRU or FRU, ensure that you mark these cables (for example: "Left" and "Right"). This way you can avoid cabling issues during the re-connection.

Only replace the CRU and FRU of one node/switch at a time. This will avoid mixing up cables between the nodes.

1.2 References

- *FRU Replacement Guide*

1.3 Physical Dimensions

The following section provides a description of the physical dimensions.

1.3.1 Physical Dimensions and Weight

Rack:

The following table displays the dimensions of the Active Archive System:

Hardware	Dimensions and Weight
Active Archive System	(height x width x depth) 82.52 inches x 23.62 inches x 40.35 inches 2,041 millimeters x 600 millimeters x 1,025 millimeters
	(weight) 2,250 lbs. 1,020 kg.

Table 1: Active Archive System Dimensions

1.3.2 Weight

Rack:

The following table displays the weight of the Active Archive System:

Hardware	Weight
Active Archive System	2,250 lbs. 1,020 kg.

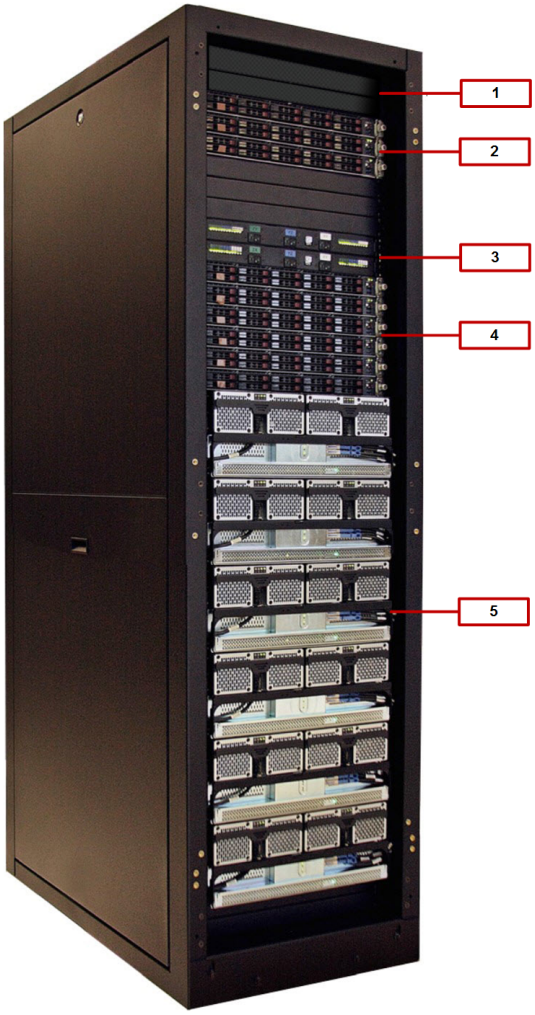
Table 2: Active Archive System Weight

Note: The weight mentioned previous is the total unpacked weight after delivery.

1.3.3 Active Archive System Configuration

The following table displays the configuration for the Active Archive System:

Figure 1: Active Archive System



Hardware	Details	Number of Product
(1) Storage Interconnect	Celestica D2020	2
(2) Controller Nodes	Supermicro 1028U-TR4T+	3
(3) Power Distribution Unit	Delta PDU: Chatsworth Horizontal mount PDU, 30A 200-208Vac, 3-Phase **or** WYE PDU: Chatsworth Horizontal mount PDU, 16A 380-415Vac, 3-Phase	2
(4) Storage Nodes	Supermicro SYS-1018R-WCOR	6
(5) Storage Enclosure Basic	For the basic configuration, there are 98 drives per Storage Enclosure Basic.	6

Table 3: Active Archive System Full Configuration

2 For More Information

Topics:

- Points of Contact

This chapter provides points of contact for the Active Archive System.

2.1 Points of Contact

For further assistance with the Active Archive System, contact Elastic Storage Platforms support. Please be prepared to provide the following information: serial number (S/N), product name, model number, and a brief description of the issue.

Telephone:

Region	Telephone Numbers	Support Hours and Additional Information
United States/International	1-408-717-7766	24 hours a day, 7 days a week
North America	1-844-717-7766	24 hours a day, 7 days a week Toll-free

Email:
support@hgst.com

Website:
www.hgst.com/support

3 Product Overview

Topics:

- Introduction
- Controller Nodes, Storage Servers, and Storage Nodes

This chapter provides a product overview of the Active Archive System.

3.1 Introduction

The Active Archive System is a unit that is vertically integrated with object storage software, networking, servers and storage in an industry standard 42U rack.

The Active Archive System is comprised of the following major components, all of which have a number of replaceable units:

- Storage Interconnect
- Controller Nodes
- Storage Nodes
- Storage Interconnect
- Power Distribution Units (PDUs)
- Storage Enclosure Basic Storage Arrays

Note: In addition to the major components, the system includes the rack, cables, rack panels, hardware, labels, power cords, and sleds.

3.2 Controller Nodes, Storage Servers, and Storage Nodes

The controller nodes run the HGST object-based storage file system which is responsible for the virtualization and management of the physical storage and all host related accesses. Each Active Archive System contains three controller nodes. The controller nodes interface to the external client network and internal data and management networks.

The Storage Server interfaces to the controller nodes and Storage Enclosure Basic storage arrays and is responsible for managing the physical storage contained in the Storage Enclosure Basic storage array, as well as, the monitoring and reporting of the status of the Storage Enclosure Basic storage enclosure components (for example, the fans, power supplies, drive FRUs, and so on).

A storage node consists of a single storage server and a single Storage Enclosure Basic storage array. There are six storage nodes in the Active Archive System.

3.2.1 Controller Node Configuration

The Controller Nodes are 1U servers. Each server used as Controller Node is configured as follows:

Storage	Quantity	Configuration
Intel E5-2650L v3 Haswell processor	2	
64GB of DDR4 2133MHz memory	4	Implemented as four 16GB DIMMS with two DIMMs populated per processor. This results in 32GB per processor.

Storage	Quantity	Configuration
PCIe Gen3 x8 riser cards	2	To support two PCIe add-in cards (AIC).
X520-DA2 SFP+ dual-port 10G NIC	2	Populated in one of the two x8 PCIe Gen 3 AIC slots mentioned previously. The port with high MAC address of each NIC will connect to the internal DATA VLAN on each of the two Celestica D2020 Redstone switches. One port with low MAC address of each NIC will connect to the external client network.
Local storage devices	6	• Two 1TB enterprise class 6Gbps SATA HDD for the Controller Node O/S and application storage • Four 240GB 6Gbps SATA SSDs for metadata storage.
1G RJ45 Ethernet management port	1	Connected to the baseboard management controller (BMC). This port is reserved for future use.
1G RJ45 on-board Ethernet ports	4	• One of the 1G on-board Ethernet ports is reserved for connection to external management network. Two of the three Controller Nodes will connect to the external management network via the reserved port. • One of the 1G on-board Ethernet ports is dual functioned for BMC/IPMI and standard TCP/IP traffic. This port is connected to management VLAN on one of the two Celestica D2020 Redstone switches. • The remaining 1G on-board Ethernet ports are reserved for future use.
Ubuntu 12.04 Linux operating system	N/A	
HGST storage appliance application software.	N/A	

Table 4: Controller Node Configuration

3.2.2 Storage Server Configuration

The storage servers are based on 1U. Each server used as storage server is configured as follows:

Storage	Quantity	Configuration
Intel E5-2650L v3 Haswell processor	1	

Storage	Quantity	Configuration
64GB of DDR4 2133MHz memory	4	Implemented as four 16GB DIMMS with one DIMM populated per memory channel per processor to facilitate maximum memory bandwidth.
PCIe Gen3 x8 riser cards	2	To support two PCIe add-in cards (AIC).
X520-DA2 SFP+ dual-port 10G NIC	1	Populated in one of the two x8 PCIe Gen 3 AIC slots mentioned previously. **Note:** These ports will be connected to the DATA VLAN on the two Celestica D2020 Redstone switches.
LSI 12G SAS HBA LSI9300-8e	1	Populated in the remaining x8 PCIe Gen 3 AIC slot. **Note:** Both SAS ports of the HBA will connect to the miniSAS HD host ports of the associated HGST Storage Enclosure Basic storage enclosure.
500GB enterprise class 6Gbps SATA HDD	2	Local storage devices for the O/S and Storage Server software
1G RJ45 Ethernet management port	1	Connected to the baseboard management controller (BMC). This port is reserved for future use.
1G RJ45 on-board Ethernet ports	2	• One of the 1G on-board Ethernet ports is dual functioned for BMC/IPMI and standard TCP/IP traffic. This port is connected to management VLAN on one of the two Celestica D2020 Redstone switches. • The remaining 1G on-board Ethernet port reserved for future use.
Ubuntu 12.04 Linux operating system	N/A	
HGST storage appliance application software.	N/A	

Table 5: Storage Server Configuration

The following table summarizes the server configurations and the rack architecture and component interconnections:

Hardware	Controller Node	Storage Server
Processor	2x E5-2640 v3	1x E5-2650L v3
Memory	64GB DDR4 2133 Mhz	64GB DDR4 2133Mhz
Expansion slots	2x8 Gen3	2x8 Gen3
HDD	2x 1TB SATA 6Gbps	2x 500GB SATA 6Gbps
NIC	2x X520-DA2 SFP+	1x X520-DA2 SFP+
BMC/IPMI Managament Port	1G RJ45 BMC management port	1G RJ45 BMC management port
SSD	SSD Metadata 4x240GB SATA 6Gbps	N/A
SAS HBA	N/A	LSI 9300-8e x8 PCIe Gen3
Operating System	Ubuntu 12.04	Ubuntu 12.04

Table 6: Controller Node and Storage Server Configuration

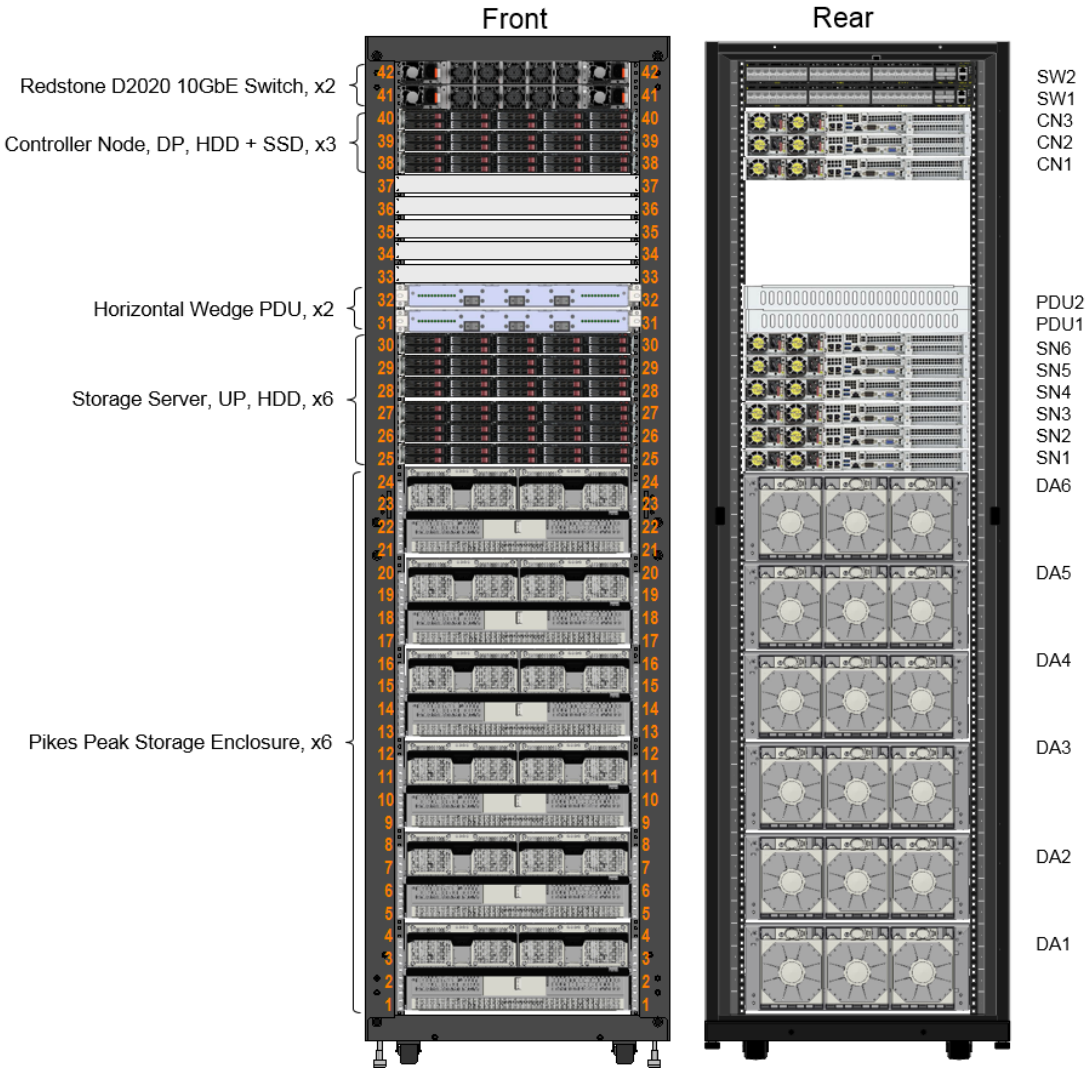
3.2.3 Switches

There are two Celestica Redstone D2020 10GE switches in a redundant configuration. There are 48 10GE ports and 4 40GE uplink ports on each switch. The 10GE ports on the switches are SFP+ and can be individually configured for copper or optical connections.

There are two VLANS configured on at least one switch: a Data VLAN and a Management VLAN. All data and data related control traffic between the Controller Nodes and Storage Nodes is routed over the data VLAN. All enclosure management data and related control traffic are routed over the Management VLAN.

The following figure displays the physical placement of the components in the Active Archive System rack. The two Redstone D2020 switches will be placed at top of the cabinet, followed by three 1U Controller Nodes, followed by 7U of reserved space, followed next by six Storage Servers, and lastly, six Storage Enclosure Basic storage arrays.

Figure 2: Active Archive System Layout Network



4 Active Archive System Components

Topics:

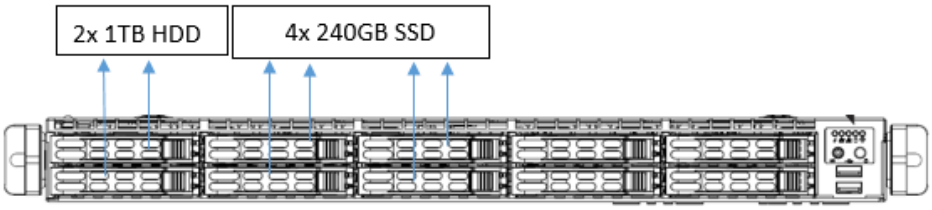
- Controller Node
- Storage Node
- TOR Switch
- Storage Device
- Cables

The following chapter provides a description of each of the Active Archive System components.

4.1 Controller Node

The controller node is a 1U. The main features include two Intel Haswell processors, 64GB DDR4 memory and 6x SATA HDD/SSD drives for the operating system, application, and metadata storage.The following figure displays the front view of controller node. The first two drive slots are populated with two 1TB SATA HDD. Four 240GB SSDs are populated in the following four slots.

Figure 3: Controller Node HDD Configuration



4.2 Storage Node

The storage node is a 1U. It is configured with a single Intel Haswell processor, 64GB DDR4 memory and 2x SATA drive for OS and storage server software. The following figure displays the storage server front view and the HDD configuration:

Figure 4: Controller Node HDD Configuration

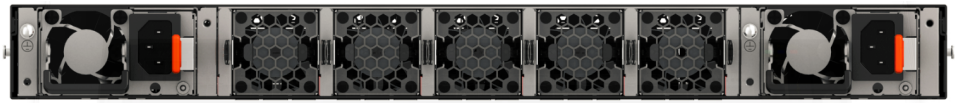
4.3 TOR Switch

The TOR Switch uses the Storage Interconnect 10G Switch. Refer to the Storage Interconnect specification for detail information. The Storage Interconnect provides up to 48 SFP+ 10GbE ports and 4 QSFP+ 40GbE ports. The following figure displays the front view of Storage Interconnect Switch:

Figure 5: Storage Interconnect Front View

The following figure displays the rear view of D2020 Switch:

Figure 6: Storage Interconnect Switch Rear View



The Switch is intended to be rear mounted in the rack, such that the cables will come out from rear of the rack and the power will be situated in the front of the rack. This configuration facilitates simplified cable management within the rack.

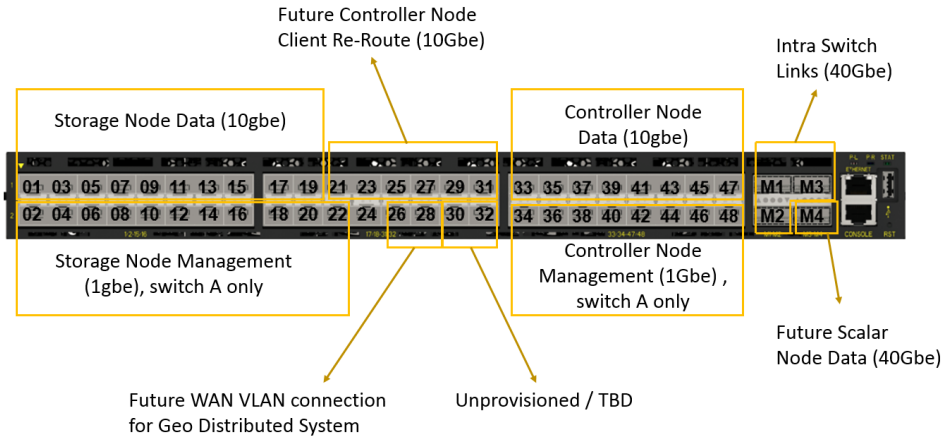
4.3.1 Port Reservations

This approach reserves port ranges on the switch for V1 as well as anticipating future port consumption:

- Allows for up to 10 Storage Nodes per rack – entire rack for storage nodes
- Allows for up to 8 Controller Nodes per rack – additional performance
- Allows for Amplidata Scalar Layer to be added including uplink and rerouting of controller nodes
- Provisions for 1Gbit management
- Provisions for WAN connection for Geo distributed use case

The following figure displays the details port reservations on switches:

Figure 7: Switch Port Reservations



4.4 Storage Device

Active Archive System is a ready out-of-the-box object storage system that transforms silos of data storage into cloud-scale active archives. For data that requires long-term retention with easy and fast retrieval, the Active Archive System provides unprecedented levels of accessibility and scalability.

4.5 Cables

The following table displays the approved cables for Active Archive System:

Description	Connection	Length	Quantity
10G SFP+ to SFP+ DAC Cable, 30AWG	Connect switch and 10G NIC on servers (controller node or storage server) for data network	1 and 1.5 meters	18
1G RJ45 Cable, CAT5E, 26AWG	Connect switch and BMC ports of servers (controller node and storage server) for management network Connect PDU management port to controller nodes	1 and 1.5 meters	9
12G miniSAS HD 4x external cable, 28 AWG	Connect Storage Enclosure Basic and miniSAS ports of storage servers	2.5 and 3 meters	12
IEC 60320 C14 to C13 Power Cord, 18AWG	Connect power inlets on PSUs of each devices to PDU outlets	1, 1.5, and 3 meters	34

Table 7: Approved Cables

5 Cabinet and Power Distribution Unit Specifications

Topics:

- Power Distribution Unit Specification

The following chapter provides a description of cabinet and power distribution unit specifications of the Active Archive System.

5.1 Power Distribution Unit Specification

The Active Archive System requires approximately 10KW of external power. The following table displays the estimated power budget:

Hardware	Description	Maximum Power (Watts)	Quantity	Amps (per)	Amps @ 208 (Volts)
Redstone	D2020, 10GbE Switch	220	2	1.06	2.1
Controller Node	Dual Socket Controller Node	540	3	2.60	7.8
Storage Server	Single Socket Storage Server	420	6	2.02	12.1
Storage Enclosure Basic	Storage Array	850	6	4.09	24.5
	Total	9,680			46.5

Table 8: Power Budget

6 Environmental Requirements

Topics:

- Operating Environment
- Storage Environment

The following chapter displays the operating and storage environmental requirements.

6.1 Operating Environment

The following table displays the operating conditions of the Active Archive System.

Operating	Active Archive System
Temperature	20° to 40°C de-rated 2% per 1,000 feet altitude increase
Humidity	8% to 90% (non-condensing)

Table 9: Operating Environment

6.2 Storage Environment

The following table displays the operating conditions of the Storage Enclosure Basic.

Storage	Storage Enclosure Basic
Temperature	-40°C to +66°C
Humidity	Up to 95%

Table 10: Storage Environment

7 Appliance Configuration

Topics:

- Active Archive System Configuration Resources

The following chapter displays the resources for configuration of the Active Archive System.

7.1 Active Archive System Configuration Resources

To configure the Active Archive System storage appliance, refer to the following software documentation:

- *HGST Active Archive System Administration Guide*
- *HGST Active Archive System Installation Guide*

Active Archive System Glossary

A

AC	**Alternating Current**
ACMA	**Australian Communications and Media Authority**

Top of A | Top of Glossary

B

BIOS	**Basic Input/Output System**
BIS	**Business Information System**
BIST	**Built-In Self-Test**
BMC	**Baseboard Management Controller**
BOM	**Bill of Materials**
BSMI	**Bureau of Standards, Metrology and Inspection**

Top of B | Top of Glossary

C

CDB	**Computer Data Bus**
CLI	**Command Line Interface**
CS	**Climate Saver**

Top of C | Top of Glossary

D

DC	**Direct Current**

Top of D | Top of Glossary

E

EC	**Engineering Change**
EEPROM	**Electrically Erasable Programmable Read-Only Memory**
EMC	Electromagnetic Compatibility
EMI	**Electromagnetic Interference**
ESD	**Electrostatic Discharge**
EVPD	**Enable Vital Product Data**

Top of E | Top of Glossary

F

FCC	**Federal Communications Commission**
FRU	**Field Replaceable Unit**
FW	**Firmware**

Top of F | Top of Glossary

G

GBE	**Gigabit Ethernet**
GPIO	**General-Purpose Input/Output**
GUI	**Graphical User Interface**

Top of G | Top of Glossary

H

HD	**Hard Drive**
HDD	**Hard Disk Drive**

Top of H | Top of Glossary

I

ICT	**In-circuit Test**
IEC	**International Electrotechnical Commission**
I/O	**Input/Output**
IOC	**Input/Output Controller**
IOM	**I/O Module**
IPMI	**Intelligent Platform Management Interface**

Top of I | Top of Glossary

J

JBOD	**Just a Bunch of Disks**

Top of J | Top of Glossary

K

KVALITET	Spell out acronym here

Top of K | Top of Glossary

L

LED	**Light-Emitting Diode**
LPC	**Low Pin Count**
LPH	**Low Profile Hybrid**
LUN	**Logical Unit Number**

Top of L | Top of Glossary

M

MAC	**Media Access Control**
miniSAS	**Mini Statistical Analysis System**

Top of M | Top of Glossary

O

OS	**Operating System**
OUI	**Organizationally Unique Identifier**

Top of O | Top of Glossary

P

PCB	**Printed Circuit Boards**
PCI	**Peripheral Component Interconnect**
PDB	**Power Distribution Board**
PDU	**Power Distribution Unit**
PMBus	**Power Management Bus**
POST	**Power On Self Test**
PSU	**Power Supply Unit**
PHY	**Physical Layer**
PWM	**Pulse-Width Modulation**
PWR	**Power**

Top of P | Top of Glossary

R

ROC	**Recovery Oriented Computing**
RTC	**Real Time Clock**

Top of R | Top of Glossary

S

SAS	**Serial Attached SCSI**
SATA	**Serial Advanced Technology Attachment**
SBB	**Storage Bridge Bay**
SCSI	**Small Computer System Interface**
SDK	**Software Development Kit**
SEP	**SCSI Enclosure Processor**
SES	**SCSI Enclosure Services**
SMART	**Self-Monitoring, Analysis and Reporting Technology**
SMP	**Server Message Block**
SMB	**Server Message Block**
SPI	**Serial Peripheral Interface**
SSP	**Serial SCSI Protocol**

Top of S | Top of Glossary

T

TCA	**Telecommunications Computing Architecture**

Top of T | Top of Glossary

U

UART	**Universal Asynchronous Receiver/Transmitter**

Top of U | Top of Glossary

V

VBOD	**Virtualized Bunch of Disks**
VPD	**Vital Product Data**

Top of V | Top of Glossary

W

WOL	**Wake On LAN**
WOS	**Wake On SAS**

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X

XDP **XML Data Package**

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