

State of the Storage

OCP Storage Committee Report

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Represent for Asghar Riahi
OCP Storage Chair
Principal Cloud architect , Seagate

- Agenda

- Introduction
- Personal Story
- OCP Storage Committee Activities
 - - Approved Contributions
 - - Contributions Currently Under Review
- OCP Storage Call To Action
- OCP Storage Resources
- Links

Introduction Asghar Riahi / Seagate

- Chairman of the OCP Storage Committee since Oct. 2013 - First elected committee chairman in OCP
- asghar.riahi@ocproject.net, asghar.riahi@seagate.com

Background:

- Principal Cloud Architect, Seagate / Cupertino 2 Years
- Master Technologist , HP / Paolo Alto, CA 13 Years
- Unix Systems Manager, MCI Systemhouse Data Center / Napa, CA 2 Years
- System programmer, Siemens AG / Austria & Germany 7 Years
- MS Computer Science / Vienna University of Technology

A Short Personal Story

[comp.os.minix](https://groups.google.com/forum/#!msg/comp.os.minix/dINtH7RRrGA/SwRavCzVE7gJ) › Hello everybody out there using minix –
August 25 1991

I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones. This has been brewing since april, and is starting to get ready. I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things).

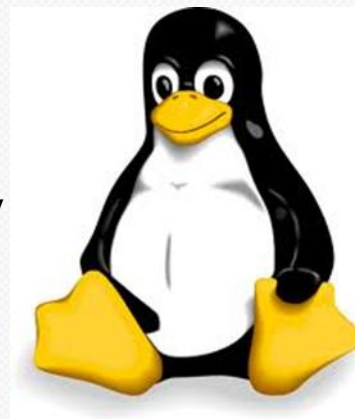
I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I'll get something practical within a few months, and I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)

Linus (torv...@kruuna.helsinki.fi)

PS. Yes - it's free of any minix code, and it has a multi-threaded fs. It is NOT protable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-).

<https://groups.google.com/forum/#!msg/comp.os.minix/dINtH7RRrGA/SwRavCzVE7gJ>

In 1991 I started working on my master thesis with the topic: ISO-OSI 7 Layer Simulation at Vienna University of Technology and needed to borrow some books. Then I saw a message....



OCP Storage Committee Activities

Approved Contributions

OCP Storage Project Activities

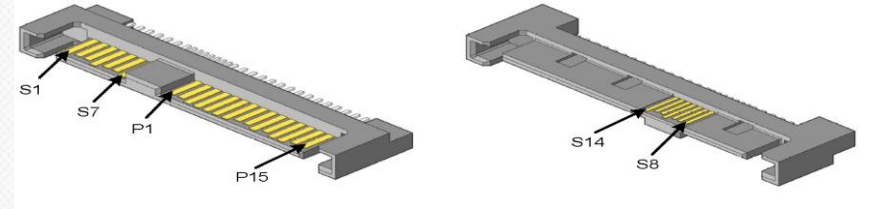
Reviewed and approved five contributed projects since Oct 2013 as follow:

- [Storage device with Ethernet Interface](#), Seagate (Approved by IC)
- [Decathlete Server Board Standard v1](#), Intel (Approved by IC)
- [Open Vault Storage Hardware V0.8](#), Facebook (Approved by IC)
- [Cold Storage Hardware v0.7](#), Facebook (Approved by IC)
- [Nytro™ XP6209 Application Acceleration Card](#), Seagate (Under review by IC)

Storage device with Ethernet interface by Seagate

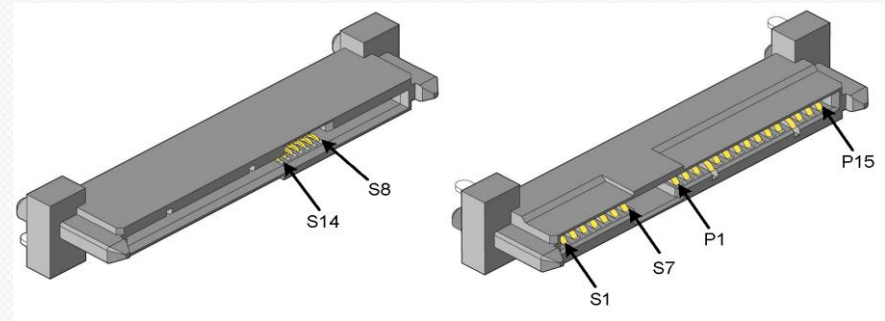
Storage device connector

The storage device with Ethernet interface plug connector is the Device Free (Plug) connector defined in SFF-8482 and SFF-8680. See the SFF specifications for detailed dimensional requirements.



System connector

The system backplane receptacle connector is the Backplane Fixed (Receptacle) connector defined in SFF-8482 and SFF-8680. The backplane receptacle connector defined by SFF-8639 MAY also be used.



Storage device with Ethernet interface by Seagate

Single port T-Card for storage device with Ethernet interface

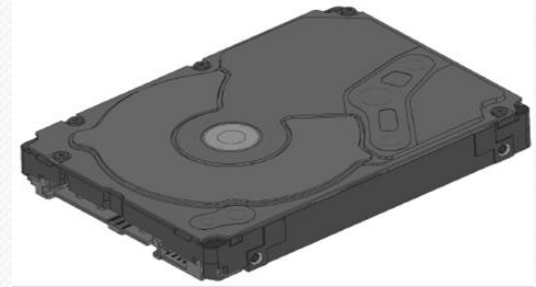
T-Card storage device receptacle connector

The single port T-Card card uses a Backplane Fixed (Receptacle) connector defined in SFF-8482 and SFF-8680 to connect to a storage device with an Ethernet interface. The example single port T-Card in this specification uses straddle mount version of the Fixed (Receptacle) connector.



Storage device with Ethernet interface by Seagate

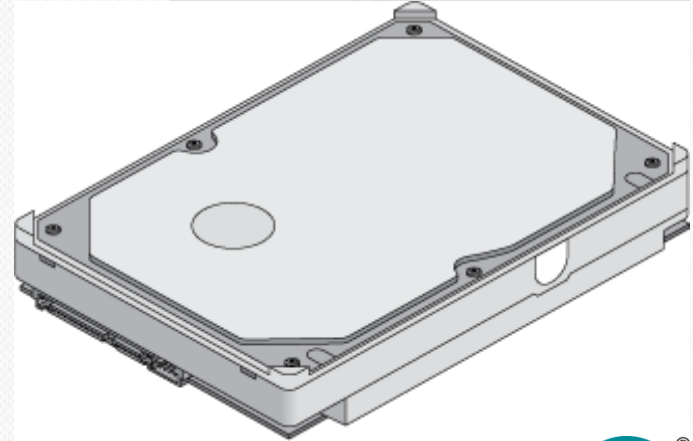
2.5" hard disk drive with
Ethernet interface plug
connector



Device form factor and connector location

The storage device with Ethernet interface form factor
SHALL comply with SFF-8201 or
SFF-8301 (2.5" and 3.5" drive form factors,
respectively).

3.5" hard disk drive with
Ethernet interface plug
connector



Storage device with Ethernet interface by Seagate – Use cases

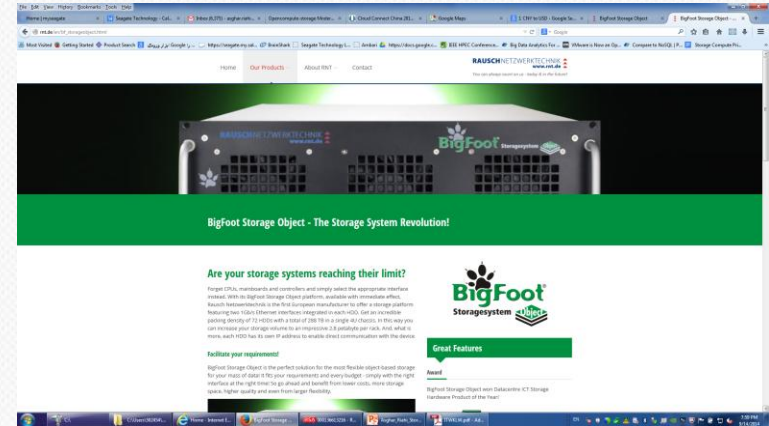
BigFoot Storage Object - The Storage System Revolution!

Key features:

- Object based storage
- Up to 288TB capacity in only 4U
- Supports Seagate Kinetic HDDs
- Each HDD with 2x 1Gb/s LAN interface
- No SAS/SATA-controller required
- Only 750mm (29,5") depth for 1,000mm (40") racks

RAUSCHNETZWERKTECHNIK
www.rnt.de

Sympathisch und gut beraten. Bestens betreut.



Links

What does 288 Terabytes of non-SAS or SATA storage get you?

<http://cloud.media.seagate.com/2014/05/20/big-foot-object-storage-storage-hardware-product-of-the-year/>

In Chinese Language:

<http://www.seagate.com/cn/zh/case-studies/rausch-bigfoot-scale-out-object-storage-seagate-kinetic-platform-cs/>

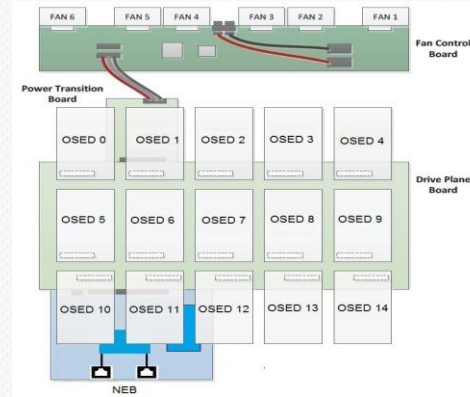
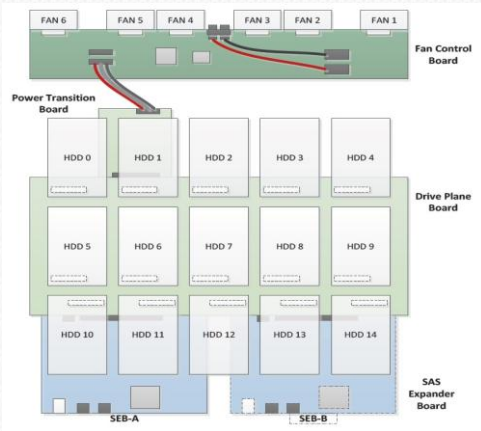
Rausch Systems:

http://rnt.de/en/bf_storageobject.html

Seagate Kinetic Solution: A look at the Rausch BigFoot Object Storage solution

<http://www.techradar.com/news/computing-components/storage/seagate-kinetic-solution-a-look-at-the-rausch-bigfoot-object-storage-solution-1232657>

Open Vault Storage System Using Ethernet Storage Device NEB instead of SEB



8 Knox storage slots per
one Winterfell server = 16
*30 = 480 HDD per Rack

No more Storage nodes needed
540 Storage Devices 18 *30 =
540).

Storage Rack			
1U	10G Switch		
1U	Empty		
2U	Empty	Winterfell	Empty
2U	SEB 1A Knox		
2U	SEB 1A Knox		
2U	SEB 2A Knox		
2U	SEB 1A Knox		
2U	SEB 2A Knox		
2U	SEB 1A Knox		
2U	SEB 2A Knox		
2U	SEB 1A Knox		
2U	SEB 2A Knox		
2U	SEB 1A Knox		
2U	SEB 2A Knox		
3U	Power Shelf		
2U	Empty	Winterfell	Empty
2U	SEB 1A Knox		
2U	SEB 2A Knox		
2U	SEB 1A Knox		
2U	SEB 2A Knox		
2U	SEB 1A Knox		
2U	SEB 2A Knox		
2U	SEB 1A Knox		
2U	SEB 2A Knox		
2U	SEB 1A Knox		
2U	SEB 2A Knox		



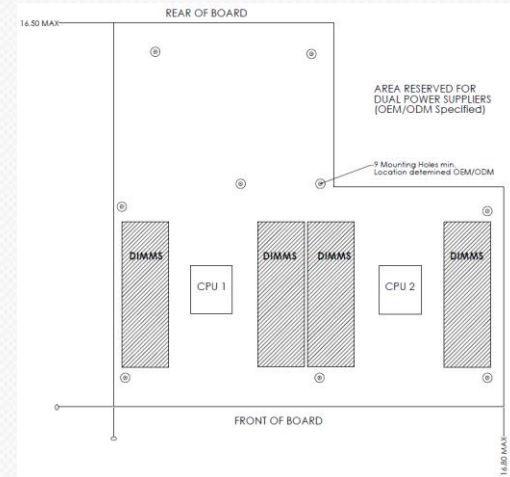
Storage Rack			
1U	10G Switch		
1U	Empty		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
3U	Power Shelf		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		
2U	SES 1A	Knox	
	SES 2A		

Decathlete Server Board Standard by Intel

Decathlete Server Board Features

The Decathlete Server Board is intended to meet the most common usages for 1U and 2U dual-socket servers in the scalable data center.

To insure the delivery of products that can be deployed over a period of time, and assure consistency in the services offered to the client of the cloud data server, certain features must be present in each model or generation of servers.



Open Vault Storage Hardware V0.8 by Facebook

The Open Vault storage unit is a 2U-30HDD storage enclosure, consisting of two identical 1U high HDD trays with 15 x 3.5" HDDs and slots for two SAS expander boards on each, one fan control board, and six redundant fan modules mounted externally in the rear of the chassis. An Open Vault storage server fits into the Open Compute Project Open Rack.



facebook

Cold Storage Hardware v0.7 by Facebook

A Cold Storage system design comprises, but is not limited to, the following aspects:

- Ability to adopt current and future HDD technologies with the lowest cost
- Capability to power off HDDs that are not in use
- Modification of storage unit (based on Open Vault)
- Configuration of an OCP compute node
- Mini-SAS fan-out cable between the Open Vault and the OCP compute node
- Custom Open Rack for the configuration of the Cold Storage system
- Redefined topology for networking switch deployment
- New power consumption provisioning, and new data center floor plan, and so forth.

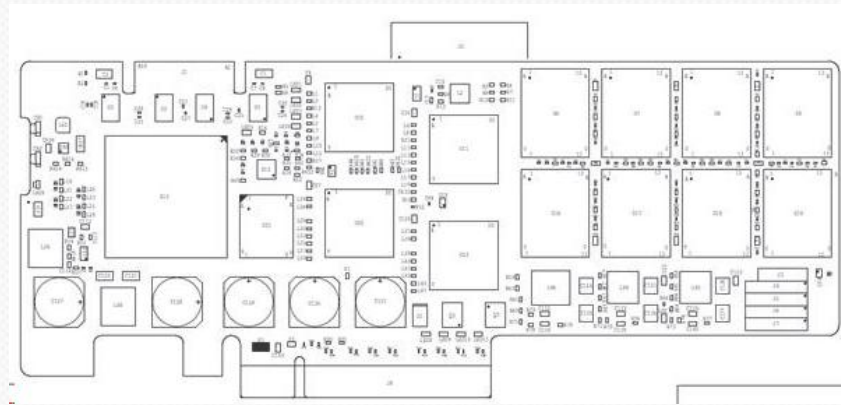
Rack A				Rack B				Rack C			
Position:	1.3kV HDD			Position:	1.3kV HDD			Position:	1.3kV HDD		
41	2U	Empty		41	2U	Cisco 3064 30G Switch		41	2U	Empty	
40	2U	Empty		40	2U	Empty		40	2U	Empty	
39	2U	Empty	Winterfell	39	2U	Empty	Winterfell	39	2U	Empty	Winterfell
38	2U	Empty	Empty	38	2U	Empty	Empty	38	2U	Empty	Empty
37	2U	Empty		37	2U	Empty		37	2U	Empty	
36	2U	Cold Storage		36	2U	Cold Storage		36	2U	Cold Storage	
35	2U	Cold Storage		35	2U	Cold Storage		35	2U	Cold Storage	
34	2U	Cold Storage		34	2U	Cold Storage		34	2U	Cold Storage	
33	2U	Cold Storage		33	2U	Cold Storage		33	2U	Cold Storage	
32	2U	Cold Storage		32	2U	Cold Storage		32	2U	Cold Storage	
31	2U	Cold Storage		31	2U	Cold Storage		31	2U	Cold Storage	
30	2U	Cold Storage		30	2U	Cold Storage		30	2U	Cold Storage	
29	2U	Cold Storage		29	2U	Cold Storage		29	2U	Cold Storage	
28	2U	Cold Storage		28	2U	Cold Storage		28	2U	Cold Storage	
27	2U	Cold Storage		27	2U	Cold Storage		27	2U	Cold Storage	
26	2U	Cold Storage		26	2U	Cold Storage		26	2U	Cold Storage	
25	2U	Cold Storage		25	2U	Cold Storage		25	2U	Cold Storage	
24	2U	Cold Storage		24	2U	Cold Storage		24	2U	Cold Storage	
23	2U	Cold Storage		23	2U	Cold Storage		23	2U	Cold Storage	
22	2U	Cold Storage		22	2U	Cold Storage		22	2U	Cold Storage	
21	3U	Power Shelf		21	3U	Power Shelf		21	3U	Power Shelf	
20	2U	Empty	Winterfell	20	2U	Empty	Winterfell	20	2U	Empty	Winterfell
19	2U	Empty	Empty	19	2U	Empty	Empty	19	2U	Empty	Empty
18	2U	Empty		18	2U	Empty		18	2U	Empty	
17	2U	Empty		17	2U	Empty		17	2U	Empty	
16	2U	Cold Storage		16	2U	Cold Storage		16	2U	Cold Storage	
15	2U	Cold Storage		15	2U	Cold Storage		15	2U	Cold Storage	
14	2U	Cold Storage		14	2U	Cold Storage		14	2U	Cold Storage	
13	2U	Cold Storage		13	2U	Cold Storage		13	2U	Cold Storage	
12	2U	Cold Storage		12	2U	Cold Storage		12	2U	Cold Storage	
11	2U	Cold Storage		11	2U	Cold Storage		11	2U	Cold Storage	
10	2U	Cold Storage		10	2U	Cold Storage		10	2U	Cold Storage	
9	2U	Cold Storage		9	2U	Cold Storage		9	2U	Cold Storage	
8	2U	Cold Storage		8	2U	Cold Storage		8	2U	Cold Storage	
7	2U	Cold Storage		7	2U	Cold Storage		7	2U	Cold Storage	
6	2U	Cold Storage		6	2U	Cold Storage		6	2U	Cold Storage	
5	2U	Cold Storage		5	2U	Cold Storage		5	2U	Cold Storage	
4	2U	Cold Storage		4	2U	Cold Storage		4	2U	Cold Storage	
3	2U	Cold Storage		3	2U	Cold Storage		3	2U	Cold Storage	
2	2U	Cold Storage		2	2U	Cold Storage		2	2U	Cold Storage	
1	2U	Cold Storage		1	2U	Cold Storage		1	2U	Cold Storage	
WF Sub Point 1 2 3				WF Sub Point 1 2 3				WF Sub Point 1 2 3			

Seagate® Nytro™ XP6209 Application Acceleration Card (Currently under review at IC)

The Seagate Nytro XP6209 Application Acceleration Card acts as a PCIe-based block storage device and presents itself to the operating system (OS) through LSISAS2008 Fusion-MPT™ interface.

This device uses an LSISAS2008 controller with firmware running on the LSISAS2008 I/O controller processor. Four of the LSISAS2008 ports are connected to each of the four Flash Storage Processors (FSPs), and each FSP is connected to 256-GB MLC NAND. Additional features include the following:

- Card dimensions are 68.9 mm × 167.65 mm, PCI Express Local Bus Specification, Revision 2.0 low-profile, half-length card.
- Current support for PCI Express Local Bus Specification, Revision 2.0.
- Eight full-duplex PCIe lanes.
- Four FSPs.
- LSISAS2008 core voltages are 1.0 V, 1.8 V derived from PCI 3.3 V, and 3.3 V, derived from 12.0 V through switching regulators.
- Embedded Drive Voltages are 1.0 V, 1.8 V, 2.8 V, and 3.3 V are derived from 12.0 V.
- Capacitance backup on the embedded drives provides 15-ms uptime after a power failure.
- 8-MB NOR Flash.
- 32-KB NVSRAM.
- Debug LEDs: Heartbeat LED for the LSISAS2008 controller, Status and Fault LEDs for each of the four FSPs.
- ICE connector pads and hot-plugg



OCP Storage Committee Activities

Contributions Currently Under Review

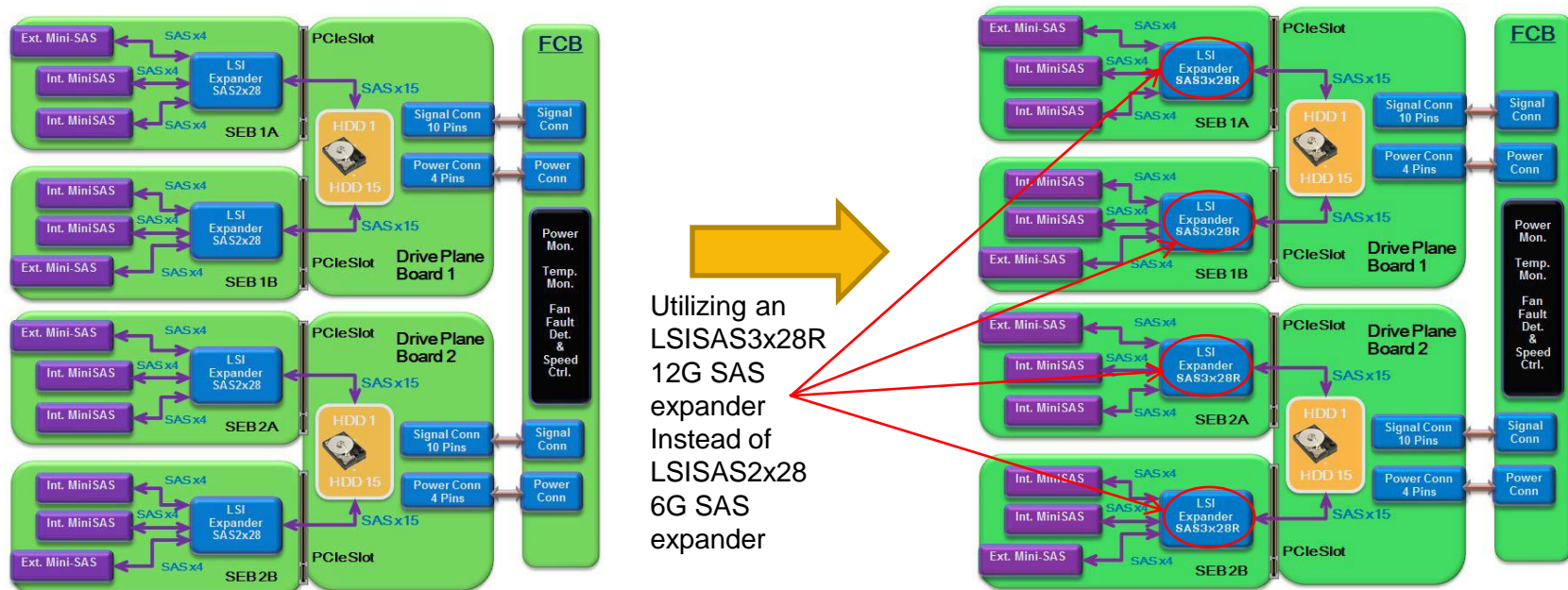
OCP Storage Committee – Projects Under Review

Open Vault Storage Hardware V0.85

Avago

OCP C&I Storage Certification Specification and Test Plan OCP C&I

Open Vault Storage Hardware V0.85 By Avago Technologies (Ex. LSI)



Open Vault System Block Diagram

OCP C&I Storage Certification Test Document

OCP C&I Storage
Certification Specification and Test Plan
Version 0.14

The aim of this document is to provide all the information needed to perform OCP Certified testing on a proposed Open Compute compliant platform. It will provide information on getting and installing the testing tools as well as outline several test cases and provide additional information.



UTSA OCP Certification &
Solution Laboratory



OCP Storage – Contribute

“Our first step for the Open Compute Project is releasing the specifications and mechanical drawings. The second step is working with the community to improve them” From [OCP Sepcs & Designs](#)

“We believe that openly sharing ideas, specifications and other intellectual property is the key to maximizing innovation and reducing operational complexity in the scalable computing space. The Open Compute Project Foundation provides a structure in which individuals and organizations can share their intellectual property with Open Compute Projects. “ — From [OCP MISSION STATEMENT](#)

OCP Storage – CALL TO ACTION:

COLLABORATE

CONTRIBUTE

CONSUME

OCP Storage Resources

OCP Main Website: <http://www.opencompute.org>

OCP Storage web site: <http://www.opencompute.org/projects/storage/>

OCP Storage Wiki: <http://www.opencompute.org/wiki/Storage>

OCP Storage Project Specs:
<http://www.opencompute.org/wiki/Storage/Dev>

Email: asghar.riahi@ocproject.net, asghar.riahi@seagate.com

How to Join the OCP Storage

Check Amber's Get Involved site:

<http://www.opencompute.org/community/get-involved/>

Mailing List

<http://lists.opencompute.org/mailman/listinfo/opencompute-storage>

Monthly Calls

<http://www.opencompute.org/wiki/Storage>

Contact via Email:

opencompute-storage@lists.opencompute.org

asghar.riahi@ocproject.net, asghar.riahi@seagate.com

Meetup.com

<http://www.meetup.com/Open-Compute-Project/>



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Get Involved

www.opencompute.org/get-involved

THANK YOU

