SCSI EXPRESS

Fast and Reliable Flash Storage for the Enterprise

STA
SCSI Trade Association

STEC
The SSD Company™

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Steve Johnson, LSI
Distinguished Engineer

Extending the SCSI Platform of Innovation

August 22, 2012

What is SCSI Express?

➢ Proven SCSI protocol combined with PCIe creating an industry standard path to PCIe-based storage

Why do we need SCSI Express?

➢ Deliver proven enterprise storage for PCIe based storage devices

➢ Take advantage of lower latency PCIe to improve performance

➢ Unified management and programming interface

SCSI Express Value Proposition

Performance and Innovation

- ➤ Increased performance through lower latency for emerging advanced technologies

- ➤ Enables new storage architectures

Reliability

- ➤ Proven enterprise SCSI ecosystem

- ➤ Architected for nonstop availability

Investment Protection

- ➤ Coexistence with SAS via Express Bay and common command set

- ➤ Leveraging robust middleware ecosystem

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SCSI Express Components

Existing industry initiatives delivering enterprise storage using PCI Express

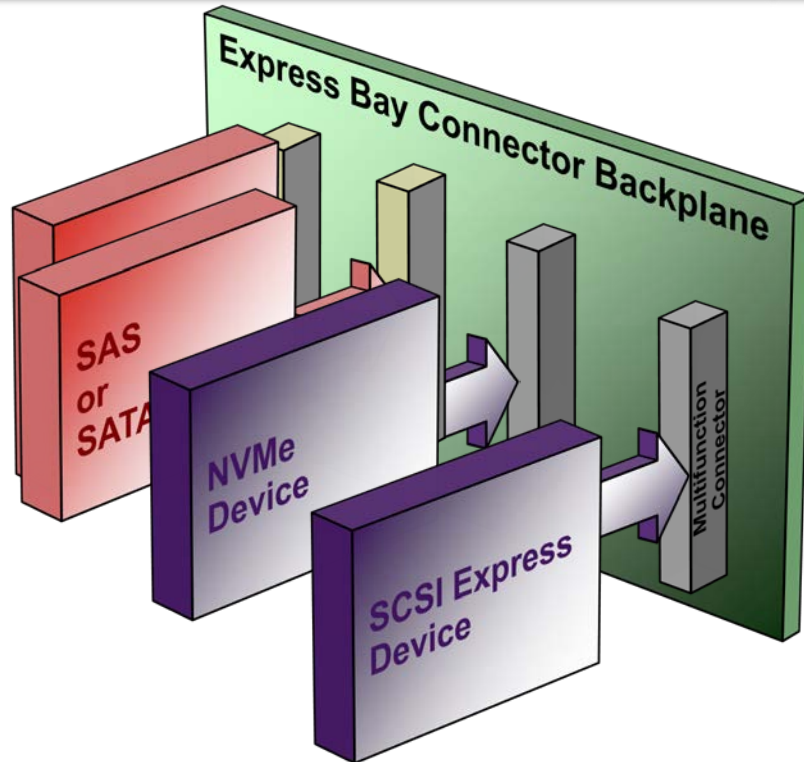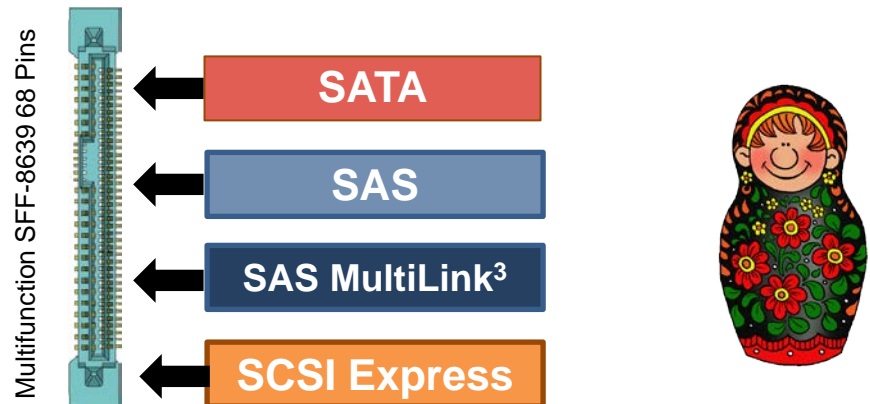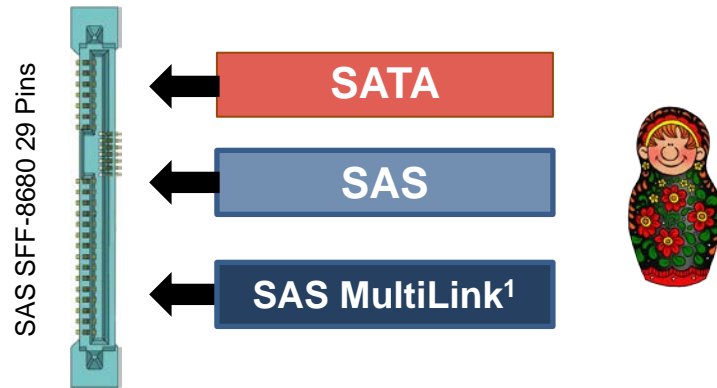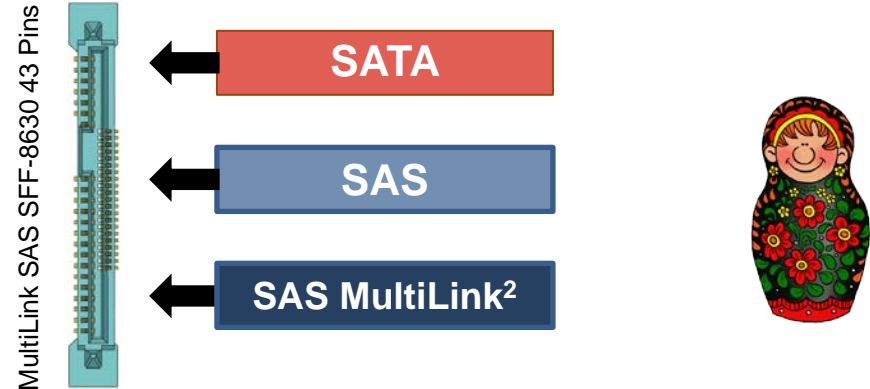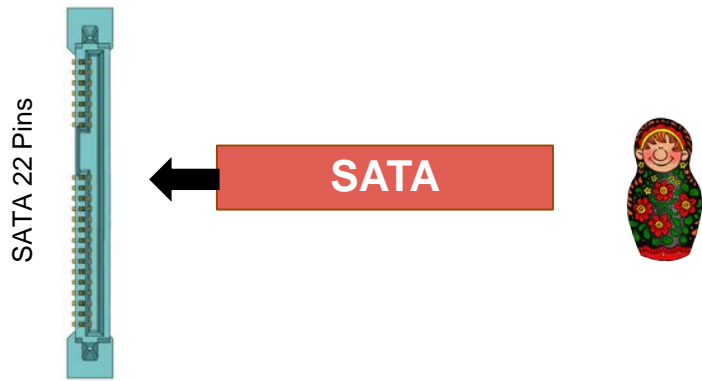| Technology	Description
SCSI	The storage command set
SCSI Over PCIe (SOP)	Packages SCSI for a PQI queuing layer
PCIe Queuing Interface (PQI)	Flexible, high-performance queuing layer
Express Bay connector (SFF 8639)	Accommodates PCIe, SAS, and SATA drives
PCI Express	Leading server I/O interconnect

Express Bay

- Up to 25 Watts
- SFF-8639 connector
- PCI-SIG electrical specification

Objectives

- Preserve the enterprise storage experience for PCI Express storage
- Meet SSD performance demands
- Serviceable, hot-pluggable Express Bay opens up new possibilities…

Connector Compatibility

SATA 22 Pins → SATA

MultiLink SAS SFF-8630 43 Pins → SATA, SAS, SAS MultiLink[2]

SAS SFF-8680 29 Pins → SATA, SAS, SAS MultiLink[1]

Multifunction SFF-8639 68 Pins → SATA, SAS, SAS MultiLink[3], SCSI Express

[1] Max two links operate

[2] Four links operational

[3] Two or four links operation depending on host provisioning

SCSI Express Hardware/Software

SCSI
Express Controllers

➢ Supports SOP-PQI driver functionality on the controller to the target device on the PCIe lanes

➢ Typically supports SAS/SATA devices

SCSI
Express Drive/Device

➢ SOP-PQI protocol

➢ Connects to SFF-8639

➢ PCIe up to x4 interface

SCSI
Express Driver

➢ Driver supplied by storage OEMs, IHVs or OSVs

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SCSI Express Summary

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➢ Increased performance through lower latency

➢ Coexistence with SAS via Express Bay and common command set

➢ Unified management and programming interface

STA Member Companies

SCSI EXPRESS

http://www.scsita.org/library/scsi-express/

Storage Interface Comparison

	SATA	SAS		PCIe		
	SATA	SAS	Multilink SAS	SCSI Express	NVM Express	Proprietary
Drive Form Factors	1.8", 2.5", 3.5"	2.5", 3.5"	2.5"	2.5"	2.5", Card	Card
No. of Ports/ Lanes	1	1, 2	1, 2, 4	1, 2, 4	1, 2, 4 (8 on card)	1, 2, 4, 8
Command Set/ Queuing Interface	ATA / SATA-IO	SCSI / SAS	SCSI / SAS	SCSI / SOP / PQI	NVM Express	Vendor-Specific
Transfer Rate	6Gb/s	12Gb/s	12Gb/s	8 Gb/s	8 Gb/s	8Gb/s
Drive Connector	SFF-xxxx	SFF-8680	SFF-8630 SFF-8639	SFF-8639	SFF-8639 (2.5"), CEM (Edge-Card)	CEM (Edge-Card)
Express Bay Compatible?	Yes (2.5")	Yes (2.5")	Yes (2.5")	Yes (2.5")	Yes (2.5")	N/A
Drive Power	9W Typical (2.5")	9W Typical (2.5")	Up to 25W	Up to 25W	Up to 25W	Vendor Specific
Max Bandwidth	0.6 GB/s	4. 8 GB/s (x2)	9.6 GB/s (x4)	8 GB/s (x4)	8 GB/s (x4)	16GB/s (x8)
System & Use Case Considerations						
Host Driver Stack (Storage Controller/ Direct Drives)	AHCI	IHV	IHV	Common Driver Possible (SOP/PQI)	Common Driver Possible (NVM Express)	IHV
Surprise Removal/ Insertion ('Hot Plug')	Yes	Yes	Yes	Future Enhancement	Future Enhancement	Vendor Specific

CY2012		CY2013		CY2014	
1H'12	2H'12	1H'13	2H'13	1H'14	2H'14

SCSI Express devices/ controllers available

Plugfest #2 1H 2014

Plugfest #1 2H 2013

SCSI Express Based drivers 1H 2013

SCSI Express Samples 1H 2013

SOP/PQI Letter Ballot SPEC Stability 2H 2012

Express bay available 2H 2012

SOP proposal complete 2H 2012