

SAS Technology

1. What is SAS

SAS – Serial Attached SCSI, A natural transition from parallel SCSI to serial

2. Why Serialize?

Signal skew and crosstalk; Signal termination restrictions; Cable and connector reflections; Device addressability

3. SAS Performance

3.0Gbps(300MB/s)per single SAS port; Port Aggregation, eg. Combine 4 ports to a single 12Gbps WIDE PORT (x4 port); Full Duplex (24 Gbps); Multiple Initiators and Targets (with Expander); Advanced Command Queuing

4. SAS Features/Benefits

Flexibility (Coexist of SAS and SATA Drives; SCSI software/middleware can be used); Scalability (Up to 16,256 SAS/SATA devices in one SAS Domain; Expander is able to connect 128 devices); Reliability (Dual Port and Multi-initiator for Fault Tolerance; Hot-swap connector; High MTBF Drive)

5. Interface Comparison

	ATA	SATA	SCSI	SAS	FC
Interface	Parallel	Serial	Parallel	Serial	Serial
Addressing	2	1, or 16 with SATA II	16	128	16 million
Connection	80-pin	7-pin	68-pin Internal/ external	7-pin	Copper/optical internal/external
Dual-port	No	No	No	Yes	Yes
Topology	Bus	Point-to-point	Bus	Point-to-point w/expanders	Loop, fabric
Duplex	Half	Half	Half	Full	Full
Max.devices	2	1, or 15 with port multiplier	16	16,256 With expanders	127-loop 16.7 million fabric
Cable length	0.4m	1m	12m	10m	30m (copper) 300m (optical)
Applications	Internal Storage	ATA RAID, server,and high- end work- station storage	Midrangeand enterprise servers	Midrangeand enterprise servers	SAN and enterprise servers

6. Advantage of SAS Interface

High Speed Serial SCSI instead of Parallel; Point-to-Point Connection; Expander for Scalability; Dual Port Connectivity; SATA Compatible Dual 7-pin Interface; Port Aggregation e.g. x4 WIDE PORT

7. What is a SAS Expander?

SAS devices:

(1) end devices:

SAS initiator devices (hosts), SAS target devices (peripheral devices) , and SATA devices

(2) expander devices:

edge expanders (sets), and fan-out expanders

Expander devices are the intermediary devices that allow more than one initiator to have a connection to more than one target.