QSFP addition to SAS-2

T10/07-498r0

Gives needed support for longer distance connections

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QSFP Overview

- QSFP was originally developed for 4G FC
- QSFP specification is being formally standardized within the SFF group.
  - Current MSA exists as INF-8438
  - New spec will be SFF-8436
  - Adds support for higher data rates (up to 10G)
  - Adds management I/F support for high speed electrical signal indicators i.e. SFP+ linear, SFP+ limiting
**Why add QSFP to SAS?**

- **Supports**
  - longer lengths of interconnects
  - Multiple user selectable PMDs with a single connector:
    - Passive copper cables
    - Active copper cables
    - Active optical cables
    - Connectorized optical cables
Copper Cable
Passive & Active

Pluggable Optical Module

Active Optical Cable
QSFP – Quad Small Form-factor Pluggable

The QSFP MSA was released 12/4/2006

- The MSA defines an (8) Differential Pair / 4x Pluggable Copper & Optical Module
- 4 lanes @ up to 10 Gbps each per connector
- Uses only 30% more PCB space over SFP to get 10x data density

Optional hole in top of cage

Optional Heat Sink (74750) & Light Pipe (74750)

Optical Module (reference only)

Optical Cable (106283)

Loopback (74763)

38 ckt iPass Connector (same as PCI Express 4x) (75586)

Single Cage (74750) Optional Cage with Solid Top

Gasket or Spring finger EMI solutions

4x Passive (74757) or Active (74758) Pluggable Copper Cable

Optical Loopback (106283)
QSFP module
Electrical I/F support

- Support ‘new’ Electrical I/F: 8G to 10G
  - SFF-8431 limiting (8G-11.1G)
  - SFF-8431 linear (8G-11.1G)
  - XFI (10.3-11.1G)
  - FC-PI-4 (8.5G)
  - FC-PI-3? (10.5G)
  - 32G FC (4x8.5G?)
  - 40G FC? (4x10.5G?)
  - 40G Ethernet? (4x10.3G?)
  - IB QDR (10G)
  - 10GBASE-KR (10.3G)
  - SAS 2.0 (6G)
  - SAS 3.0 (12G?)
  - PCI Exp 3 (8G)

- Support legacy I/F: 1G to 5G
  - IB –SDR and DDR (2.5G and 5G)
  - Ethernet/SFP – (1G)
  - FC-PI-2 – (1,2,4.25G)
Media support:

- Passive copper cable
- Active copper cable
- Active optical cable
- Parallel fiber
  - SM
  - MM
Participants

- Scott Kipp (Brocade) Co-chair
- Jay Neer (Molex) Co-chair
- Tom Palkert (Luxtera) Editor
- Others?
## Estimated distances supported

<table>
<thead>
<tr>
<th></th>
<th>Direct attach copper</th>
<th>Active copper</th>
<th>Active optical</th>
<th>MM optical limiting</th>
<th>MM optical linear</th>
<th>SM Optical LC-I</th>
<th>SM optical LC-L</th>
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<td><strong>FC-PI-4 delta</strong></td>
<td>7m</td>
<td>20m</td>
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<td>100</td>
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<td>20m</td>
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<td>0.1-2km</td>
<td>&gt;50</td>
<td>&gt;100</td>
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</table>
What needs to be done?

- Add QSFP connector and card cage to SAS 2.0 specification
  - SAS 3.0 is too far out to meet the industry requirements for optical links in the next 1-3 yrs.
  - Will there be a SAS 2.x?
  - No changes to SAS electrical/jitter specs.
  - No optical specs need to be added.
    - This should be considered for SAS 3.0