SFF TA TWG Changes Coming to a Server Near You

Presented by
Anthony Constantine, Principal Engineer, Intel
Paul Coddington, Mechanical Engineer, Amphenol
About SFF TA TWG
First Off: What is the SFF TA TWG?

- SFF TA TWG develops technical specifications for:
  - Storage media
  - Storage networks
  - Pluggable solutions

- These specifications cover:
  - Cables
  - Connectors and cages
  - Form factors
  - Management interfaces
  - Copper and Optical Transceiver modules
  - Electrical interfaces
Who Are We?

Our members include participants involved in ASICs/CPUs, Data centers, interconnects, networking, research, server systems, storage devices, test equipment, and transceivers.
Our Stats

- 76 member companies
- Managing 149 published specifications
- Revising 14 published specifications
- Developing 9 new specifications

Our specifications are used by SNIA/SFF members as well as organizations including: ECIA, ANSI, IEC, PCI-SIG, INCITS (SCSI, Fibre Channel, ATA), SATA-IO, JEDEC, OIF, OCP, IEEE (Ethernet), and InfiniBand

SFF TA TWG
Co-Chairs:
- Paul Coddington
- Anthony Constantine

Connectors Subgroup
Co-Chairs:
- Paul Coddington
- Anthony Constantine

Transceivers Subgroup
Chair:
- Tom Palkert
Our Latest Publications
What Have We Done Lately?

- In the last year, we published 4 new specifications
  - SFF-TA-1033: Internal High-Speed Cable / Modular Connector System
  - SFF-TA-1031: SFP2 Cage, Connector, & Module Specification
  - SFF-TA-1027: QSFP2 Connector, Cage, & Module Specification
  - SFF-8612: MiniLink 4/8X Shielded Connector
- We also published revisions of 7 specifications
  - SFF-TA-1016: Internal Unshielded High Speed Connector System
  - SFF-TA-1009: Enterprise and Datacenter Standard Form Factor Pin and Signal Specification (EDSFF)
  - SFF-TA-1002: Protocol Agnostic Multi-Lane High Speed Connector
  - SFF-8636: Management Interface for 4-lane Modules and Cables
  - SFF-8614: Mini Multilane 4/8X Shielded Cage/Connector (HDsh)
  - SFF-8402: SFP+ 1X Pluggable Transceiver Solutions
  - SFF-8024: SFF Module Management Reference Code Tables
SFF-TA-1033: Internal High-Speed Cable / Modular Connector System

- This specification defines requirements for an Internal High-Speed Cable / Modular Connector System
  - Designed to provide an internal cable and connector solution that supports both high-speed and power transmission
  - Enables broad compatibility across future generations of host process modules.
- Compatible with SFF-TA-1016.

- **Typical Applications:** Interconnect for in-box differential cables (PCIe, SAS)
This specification defines the SFP2 module, cage and connector system
- SFP2 is an updated version of SFP to support 112Gb/s and beyond over a single lane

Backwards compatible to SFP+/SFP28
- SFP2 cage and connectors are compatible with SFP+/SFP28 modules
- Modules, connectors and cages for 50 Gb/s PAM4 marketed as "SFP56" can follow either this spec or SFF-8402

Typical Applications: Interconnect between network and storage switches, patch panels, and servers to fiber or Ethernet cables
SFF-TA-1027: QSFP2 Connector, Cage, & Module Specification

- This specification defines the mechanical requirements of the pluggable QSFP2 cages, connectors, and modules
  - QSFP2 is an updated version of QSFP to support 112Gb/s and beyond over 4 lanes
  - Defines 1x1 & 2x1 connector and cage styles
  - Defines Type 1, 2, 2A, and 2B Modules

- Backwards compatible with:
  - QSFP28 and QSFP+ modules
  - QSFP, QSFP+, QSFP28, and QSFP56 hosts (with better thermals)

- Typical Applications: Interconnect between patch panels, switches, and servers to fiber or Ethernet cables
SFF-8612: MiniLink 4/8X Shielded Connector

- Defines the mechanical requirements for MiniLink fixed receptacles
  - Designed for use in high-speed serial, interconnect applications at multi-gigabit speeds
- Mating plug is defined in SFF-8611

- **Typical Applications:** Interconnect for in-box differential cables (PCIe, SAS)
SFF-TA-1016: Internal Unshielded High Speed Connector System

- Defines the connector system for several straight and right angle plugs and receptacles
  - Options for 38, 74, 124, and 148 pin contacts
  - Application includes interconnect for in-box differential cables (PCIe, SAS)
- Changes made since prior publication:
  - Tightened tolerances of PCB to Card slot CL
  - Added dimensions of plug bottom to card CL
  - Errata fix of 2 dimensional values that were swapped
SFF-TA-1009: Enterprise and Datacenter Standard Form Factor Pin and Signal Specification (EDSFF)

- This specification provides the pinout, features, and electricals for EDSFF
  - Applications include SSDs, CXL devices, Accelerators, NICs
- Changes made since prior publication
  - Optional I3C supported added
  - Optional NIC sideband support added
  - Clarification on LED behavior

<table>
<thead>
<tr>
<th>Pin</th>
<th>Contact Sequence</th>
<th>Signal</th>
<th>Signal</th>
<th>Contact Sequence</th>
<th>Pin</th>
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</thead>
<tbody>
<tr>
<td>B01</td>
<td>2nd mate</td>
<td>NIC_PWR_GOOD</td>
<td>PERST#</td>
<td>2nd mate</td>
<td>A01</td>
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<tr>
<td>B02</td>
<td>2nd mate</td>
<td>MAIN_PWR_EN</td>
<td>PERST3#</td>
<td>2nd mate</td>
<td>A02</td>
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<tr>
<td>B03</td>
<td>2nd mate</td>
<td>LD#</td>
<td>WAKE#</td>
<td>2nd mate</td>
<td>A03</td>
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<td>B04</td>
<td>2nd mate</td>
<td>DATA_IN</td>
<td>BBT_ARB_IN</td>
<td>2nd mate</td>
<td>A04</td>
</tr>
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<td>B05</td>
<td>2nd mate</td>
<td>DATA_OUT</td>
<td>BBT_ARB_OUT</td>
<td>2nd mate</td>
<td>A05</td>
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<tr>
<td>B06</td>
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<td>A06</td>
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<td>BBT_TX1</td>
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<td>B08</td>
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<td>BBT_TXD1</td>
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<td>B09</td>
<td>2nd mate</td>
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<td>BBT_TXD0</td>
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<td>1st mate</td>
<td>A10</td>
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<td>REFCLKn2</td>
<td>REFCLKn3</td>
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<td>A11</td>
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<td>A12</td>
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<td>B13</td>
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<td>GND/NIC_DETECT#</td>
<td>GND</td>
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<td>A13</td>
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<td>BBT CRS DV</td>
<td>BBT CLK IN</td>
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<td>A14</td>
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Key

- B1: 2nd mate
- B2: 2nd mate
- B3: 2nd mate
- B4: 2nd mate
- B5: 2nd mate
- B6: 2nd mate
- B7: 2nd mate
- B8: 2nd mate

- 2nd mate
- 1st mate

- 12 V
- GND

- 12 V
- V

- GND
- MFG/bIF0#
- SMBCLK/13CLK
- RFU/bIF1#
- SMBDATA/13DATA
SFF-TA-1002: Protocol Agnostic Multi-Lane High Speed Connector

- This specification defines an unshielded, I/O, card edge connector and mating card interface capable of operation up to 112GT/s PAM4
  - 56, 84, 140, or 168 pin contacts
  - Applications include EDSFF, OCP NIC 3.0, OCP DC-CSM, and other board to board interconnects

- Changes made since prior publication
  - Added 32GT/s NRZ signal integrity requirements for the orthogonal connector
  - Updated a pin tolerance and added a note for soldermask keep out
  - Added 1 additional Straddle mount Host board thickness
SFF-8636: Management Interface for 4-lane Modules and Cables

- This specification defines a common management interface for 4-lane pluggable transceiver modules and cable assemblies.
  - Provides commonality for modules or cable assemblies with different mechanical, physical layer, and other characteristics
  - Applications include QSFP, QSFP+, mini-multilane SAS connectors,
- Changes made since prior publication
  - Added transceiver subtype and Fiber Face type identifiers to Sub device properties (Byte 117)
  - Editorial changes and updated with new naming conventions
SFF-8614: Mini Multilane 4/8X Shielded Cage/Connector (HDsh)

- This specification defines the Mini Multilane connector for high-speed serial applications. This connector is also referred to as Mini-SAS HD
  - 1x1, 1x2, and 1x4 configurations
  - Applications include PCIe and SAS cabling
- Changes made since prior publication
  - Added SMT footprint option
  - Clarified tolerances
SFF-8402: SFP+ 1X Pluggable Transceiver Solutions

- This specification provides references to the required SFF specifications necessary to implement SFP transceiver 3 modules that operate at various speeds
  - Includes SFP+ (4 Gb/s), SFP10, SFP16, SFP28, SFP56, and SFP112
  - Applications include Interconnect between network and storage switches to fiber or Ethernet cables
- Changes made since prior publication
  - Clarification of SFF-8472 and general electricals
  - Editorial changes
SFF-8024: SFF Module Management Reference Code Tables

- This specification provides reference tables for pluggable modules
  - These tables are updated with additional codes reflecting industry developments
  - Reference source for identifiers assigned to interpret the memory maps of self-identifying modules
  - Applications include SFP and QSFP transceivers used in Interconnect between patch panels, switches, and servers to fiber or Ethernet cables
- Changes made since prior publication
  - Additional codes added for media interface
  - Clarifications added in several areas

### Table 4-5 Host Electrical Interface IDs

<table>
<thead>
<tr>
<th>ID</th>
<th>ID (Hex)</th>
<th>Host Electrical Interface (Specification Reference)</th>
<th>Application Bit Rate, Gb/s</th>
<th>Lane Count</th>
<th>Lane Signaling Rate, Gbd</th>
<th>Modulation</th>
<th>b/ UI</th>
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</thead>
<tbody>
<tr>
<td>83</td>
<td>53</td>
<td>OTN (ITU-T)</td>
<td>112</td>
<td>2</td>
<td>27.9352</td>
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### Table 4-6 MMF media interface IDs

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<th>ID</th>
<th>ID (Hex)</th>
<th>MM Media Interface (Specification Reference)</th>
<th>Application Bit Rate, Gb/s</th>
<th>Lane Count</th>
<th>Lane Signaling Rate, Gbd</th>
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<th>b/ UI</th>
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### Table 4-7 SMF media interface IDs

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<th>SM Media Interface (Specification Reference)</th>
<th>Application Bit Rate, Gb/s</th>
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<th>Lane Signaling Rate, Gbd</th>
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<th>b/ UI</th>
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<td>1</td>
<td>63.1395</td>
<td>DP-QPSK</td>
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Website Search Changes

- To make searching for our specifications easier, we updated our search
  - Made project status clearer
  - Filtering now pulls documents with multiple project states
- For more info, go to https://www.snia.org/sff/specifications
Looking Ahead
What New Projects Are We Working On?

- SFF-TA-1024: Test Procedure for SFF-TA-1016 Mated Cable Assembly
- SFF-TA-1025: QSFP56 Electrical
- SFF-TA-1028: QSFP112 Electrical
- SFF-TA-1029: Cabled QSFP Cage & Connector
- SFF-TA-1032: Multi-lane External High Speed Cable System
- SFF-TA-1034: Pluggable Multi-Purpose Module
- SFF-TA-1035: Next Gen High Speed Cable Connector System
- SFF-TA-1036: Cable Optimized Boot Peripheral Connector
- SFF-TA-1037: Connectors For Pluggable Multi-Purpose Module
What specifications are Being Revised?

- SFF-8024: SFF Module Management Reference Code Tables
  - Additional codes, IDs, other progress
- SFF-8419: SFP+ Power and Low Speed Interface
  - Editorial, I2C FM, other definitional additions
- SFF-8472: Management Interface for SFP+
  - Adding registers for latency and management
- SFF-8613: Mini Multilane 4/8X Unshielded Connector (HDun)
  - Errata fixes, clarifications, editorial
- SFF-8665: QSFP+ 28 Gb/s 4X Pluggable Transceiver Solution (QSFP28)
  - Reference additions
- SFF-8679: QSFP+ 4X Hardware and Electrical Specification
  - Additional test methods
What specifications are Being Revised (Cont’d)?

- **SFF-8690: Tunable SFP+ Memory Map for ITU Frequencies**
  - Register additions, self tuning bits, references, clarifications.

- **SFF-TA-1002: Protocol Agnostic Multi-Lane High Speed Connector**
  - PCIe 6.0 support, additional straddle thickness, errata

- **SFF-TA-1008: Enterprise and Datacenter Standard Form Factor (E3)**
  - Addition of NIC sidebands, 2x1C, clarifications

- **SFF-TA-1009: Enterprise and Datacenter Standard Form Factor Pin and Signal Specification (EDSFF)**
  - PCIe 6.0 support, CXL LED, clarifications

- **SFF-TA-1020: Cables and Connector Variants Based on SFF-TA-1002**
  - Additional sizes, additional thickness, errata

- **SFF-TA-1026: Storage System High Speed Cable Interconnect**
  - Dual bay addition, errata, clarifications

- **SFF-TA-1027: QSFP2 Connector, Cage, & Module Specification**
  - Additional footprint, alternate latching, 224G support
Opinionated Plug

- Do you want to learn more details about the 10 new projects?
- Do you want to ask more details about the 14 specs being revised?
- Do you want to ask us to speculate on future projects?
- Do you want to tell us what we need to fix?

- Come to our BoF tonight and talk to our opinionated experts!
  - (there will be snacks and drinks)!
Want to Get Involved?

- **Benefits:**
  - Participation into development of SFF specifications, information documents, and reference guides
  - Ability to open new projects
  - Access to all presentations, all drafts, prior publications, and supplemental material relevant to all SFF projects
  - One of the lowest membership fees around ($1,500/year moving to $1,200/year in December)

- **Resources:**
  - How to Join: [https://www.snia.org/sff/join](https://www.snia.org/sff/join)
  - Public Site: [https://www.snia.org/sff](https://www.snia.org/sff)
  - Specifications: [https://www.snia.org/sff/specifications](https://www.snia.org/sff/specifications)
  - Questions about membership? Please send mail to [membership@snia.org](mailto:membership@snia.org)
  - Additional questions? Please send mail to [sff_ta_twgchair@snia.org](mailto:sff_ta_twgchair@snia.org)
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