REGIONAL SDC 25
BY Developers FOR Developers

Regional SDC Denver
April 30, 2025

400G for AI and Storage: Faster is Always Better

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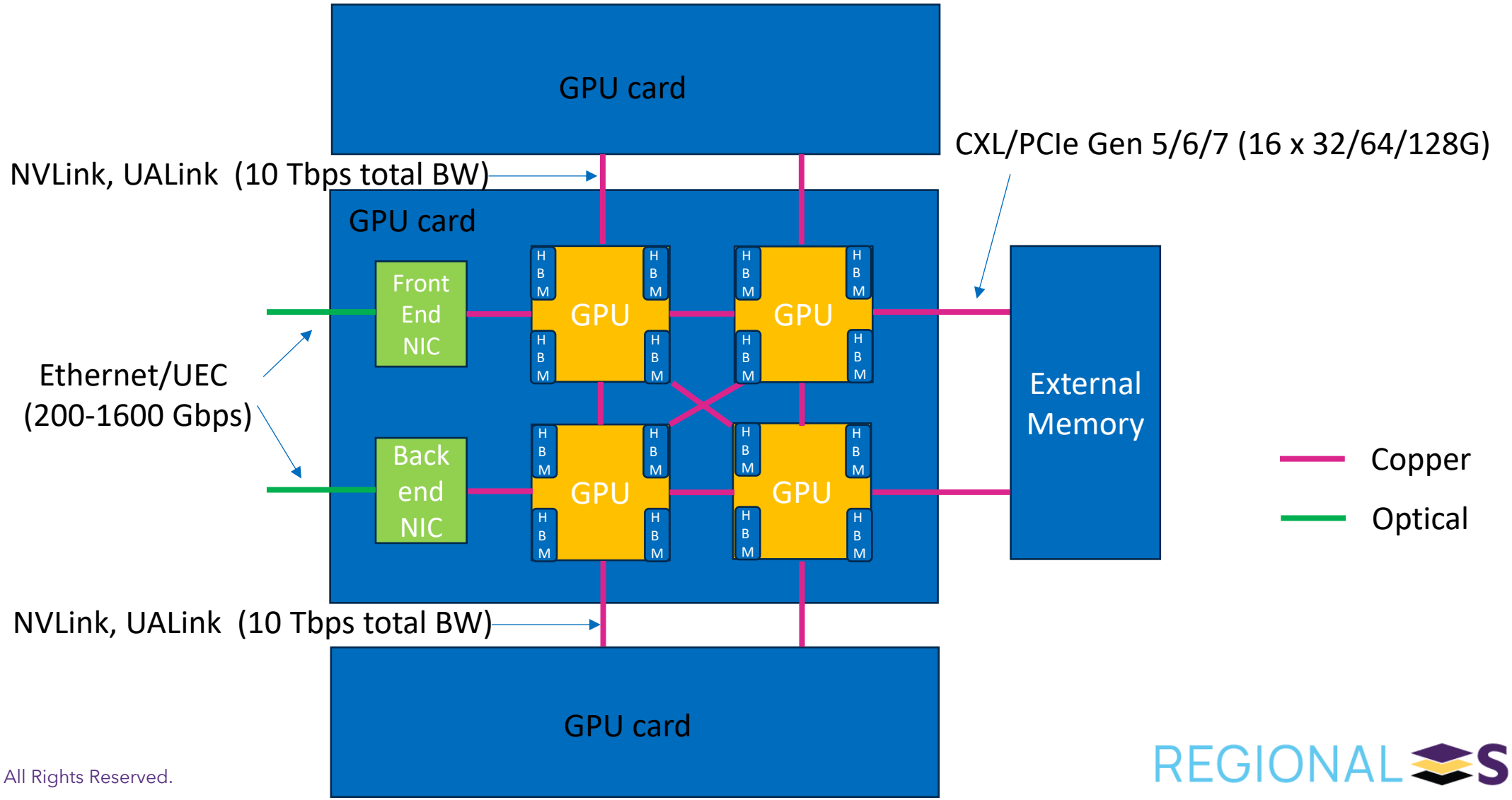
SNIA

AI interconnects



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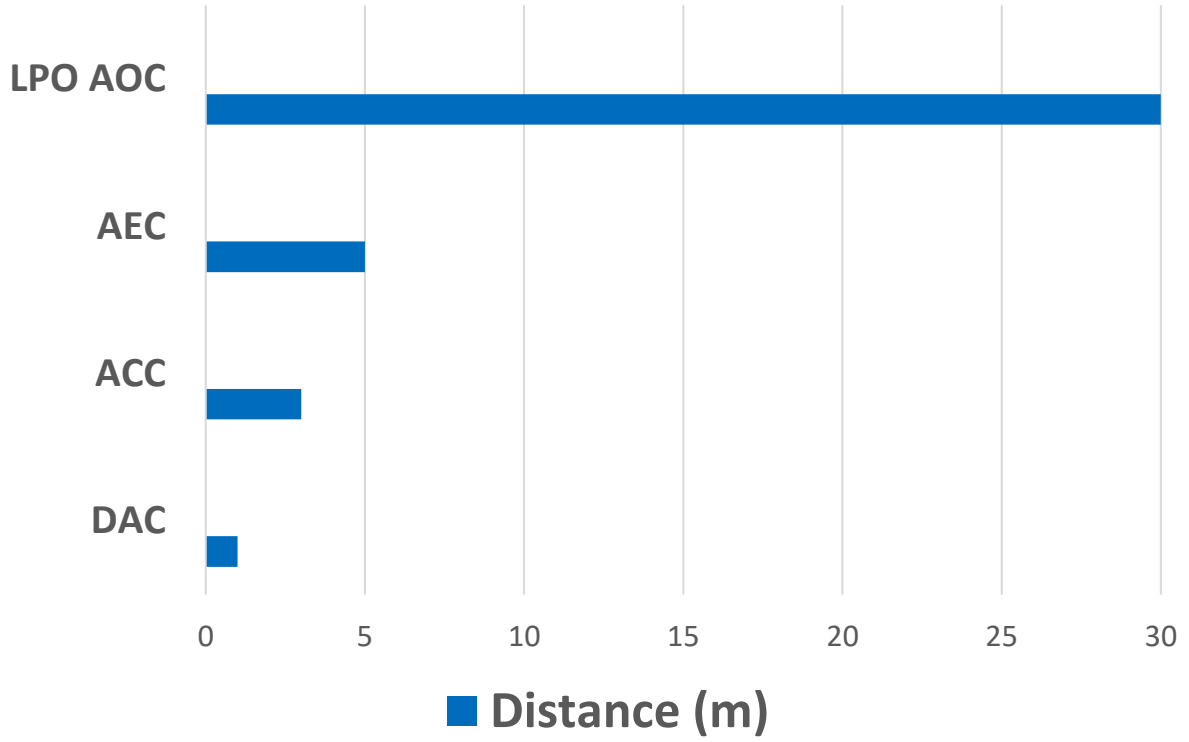
What is needed for AI copper interconnects?

Maximum reach



And the usual

- High density connectors
- High BW connectors
- Improved Host DSP
- Low BER
- Low Latency

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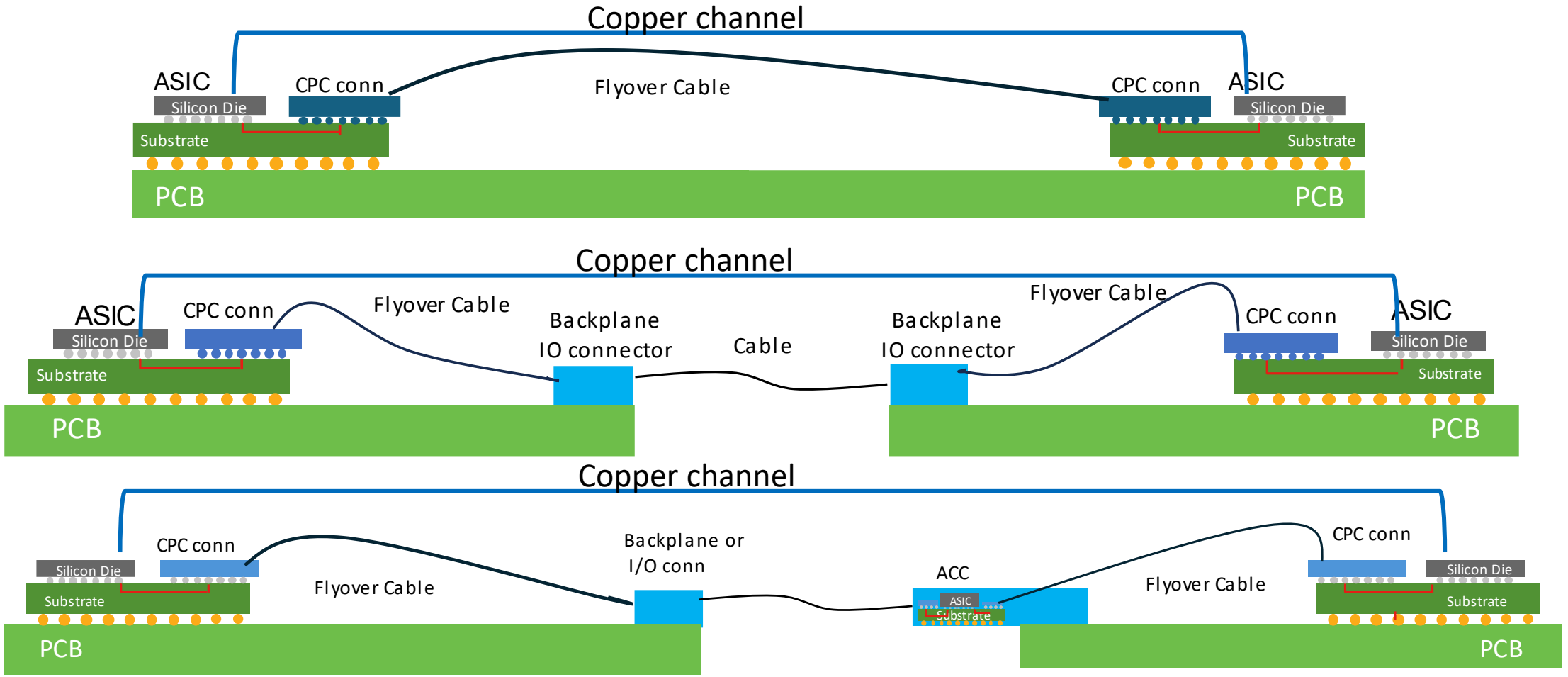
Example channels for 448G



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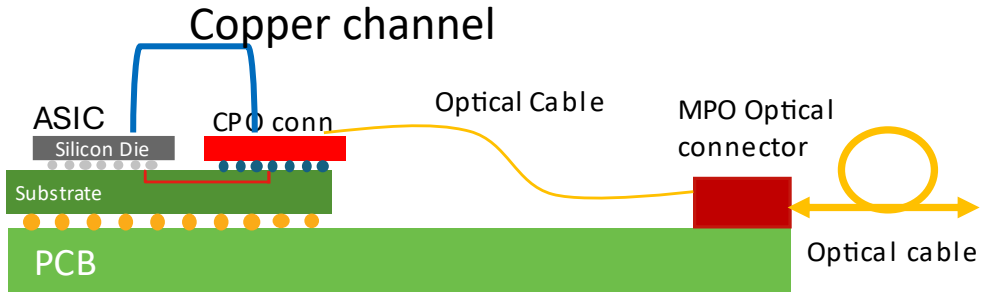
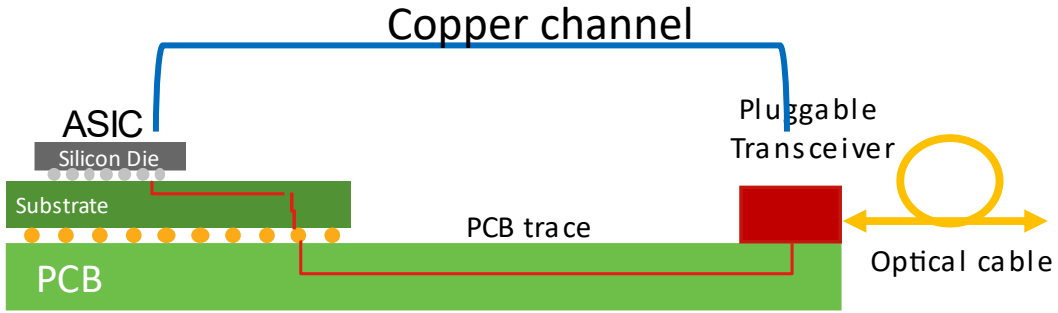
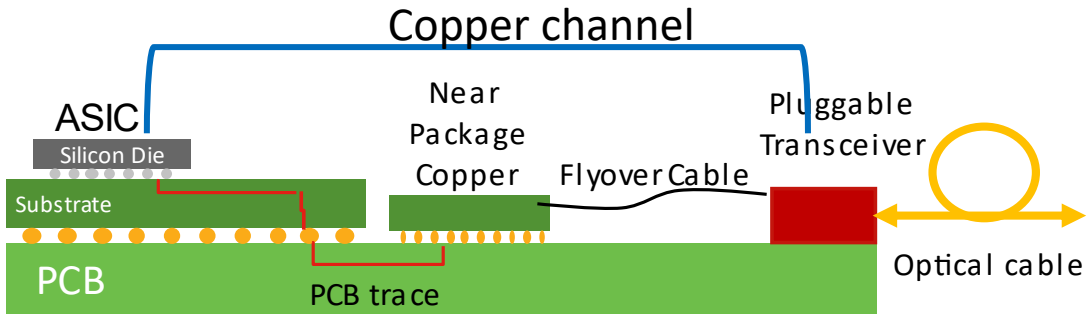
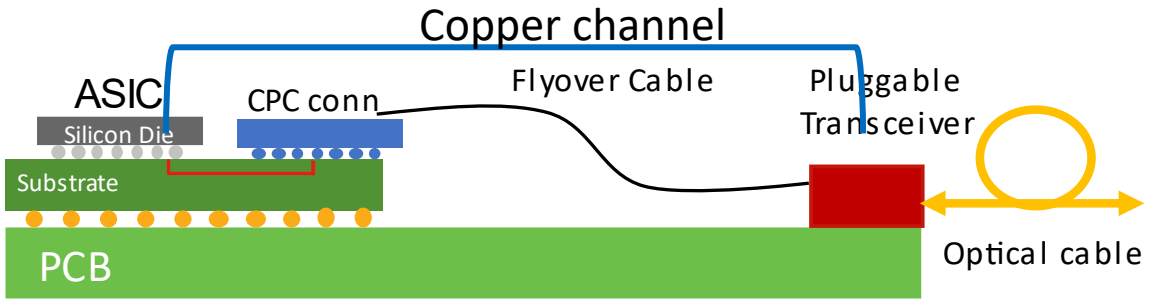
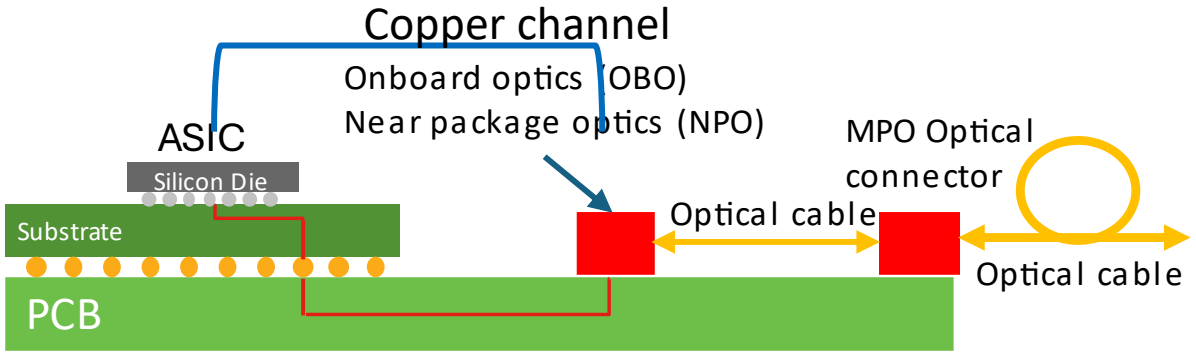
More Example channels for 448G











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New: 448Gb work started within SFF

- Scope: **Storage/compute/backplane focus**
  - 448G
    - Introduce 448G capable channels
    - Establish 448G COM parameters
    - Define package IL, ERL etc characteristics
    - Investigate optimal PAM modulation for backplane/copper channels
    - Identify additional link training requirements (if needed)
  - Investigate the use of 448G technology to increase the reach of 112G and 224G interconnects
  - Connector Mechanical specifications are out of scope for this project
    - Separate project at later date
- For more details, see SFF-TA-1043: https://members.snia.org/document/dl/55858

Proposed working plan with other organizations on 448G

- In General: SNIA/SFF project will have a Storage/compute/backplane focus vs networking/front panel focus of other groups.
- IEEE
  - Initiate 448G copper work ahead of an IEEE project
  - Liaison between SNIA/SFF and NEA AI group
- OIF
  - Get connector and channel requirements from OIF high density connector project
  - Provide feedback based on channel simulations
- OCP
- UEC/UALink
  - Request channel requirements
  - Provide copper interconnect information

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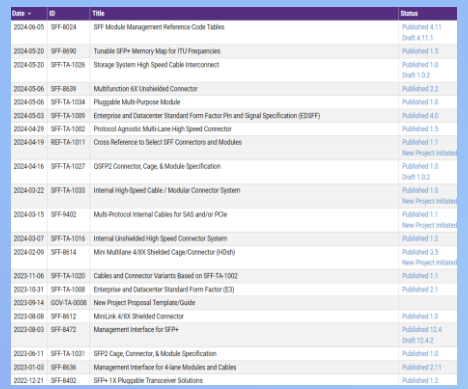
SFF overview

72 member companies

150+ published specs



Date	ID	Title	Status
2024-06-05	SFF-8024	SFF Module Management Reference Code Tables	Published 4.11 Draft 4.11.1
2024-05-20	SFF-8690	Tunable SFP+ Memory Map for ITU Frequencies	Published 1.5
2024-05-20	SFF-TA-1026	Storage System High Speed Cable Interconnect	Published 1.0 Draft 1.0.2
2024-05-06	SFF-8639	Multifunction 6X Unshielded Connector	Published 2.2
2024-05-06	SFF-TA-1034	Pluggable Multi-Purpose Module	Published 1.0
2024-05-03	SFF-TA-1009	Enterprise and Datacenter Standard Form Factor Pin and Signal Specification (EDSFF)	Published 4.0
2024-04-29	SFF-TA-1002	Protocol Agnostic Multi-Lane High Speed Connector	Published 1.5
2024-04-19	REF-TA-1011	Cross Reference to Select SFF Connectors and Modules	Published 1.1 New Project Initiated
2024-04-16	SFF-TA-1027	QSFP2 Connector, Cage, & Module Specification	Published 1.0 Draft 1.0.2
2024-03-22	SFF-TA-1033	Internal High-Speed Cable / Modular Connector System	Published 1.0 New Project Initiated
2024-03-15	SFF-8402	Multi-Protocol Internal Cables for SAS and/or PCIe	Published 1.1 New Project Initiated
2024-03-07	SFF-TA-1016	Internal Unshielded High Speed Connector System	Published 1.2
2024-02-09	SFF-8614	Mini MultiLane 4/8X Shielded Cage/Connector (HDsh)	Published 3.5 New Project Initiated
2023-11-06	SFF-TA-1020	Cables and Connector Variants Based on SFF-TA-1002	Published 1.1
2023-10-31	SFF-TA-1008	Enterprise and Datacenter Standard Form Factor (E3)	Published 2.1
2023-09-14	GOV-TA-0008	New Project Proposal Template/Guide	
2023-08-08	SFF-8612	MiniLink 4/8X Shielded Connector	Published 1.0
2023-08-03	SFF-8472	Management Interface for SFP+	Published 12.4 Draft 12.4.2
2023-06-11	SFF-TA-1031	SFP2 Cage, Connector, & Module Specification	Published 1.0
2023-01-03	SFF-8636	Management Interface for 4-lane Modules and Cables	Published 2.11
2022-12-21	SFF-8402	SFP+ 1X Pluggable Transceiver Solutions	Published 1.2

Specifications used everywhere

SFF specifications complement existing industry standards work and encompass, Cables, Connectors and cages, Form factors, Management interfaces, Copper and Optical Transceiver modules, Electrical interfaces

In the last 12 months, we:

Published 4 new specifications and Revised 9 existing specifications

SNIA

Network focused Specifications in SFF

- Transceivers (SFP+/QSFP+)
  - Module Cage, Connector, Transceiver
  - General Electricals (low speed, power, etc.)
  - Recipe for matching specs to speeds
- Module Management Reference Codes
- Management
- Cross Reference Documents

Compute and storage focused Specifications in SFF

- Cable and Connectors
  - Mechanical specs for Copprlink Internal and External PCIe Specs
  - Mechanical specs for PCIe External Cable Spec
  - SAS cables
  - Other PCIe cables and connectors (EDSFF/OCP connector, low profile connectors, etc.)
- Form Factors:
  - EDSFF form factors (E1.S, E1.L, E2, E3)
  - U.2 SSDs
  - HDDs
  - Other compute form factors (PECFF, PMM)
- Electricals and Management
  - Backplane management (UBM)
  - Electricals (EDSFF, PCIe FPP)
  - Management interfaces (Drives, cables)
- Cross Reference Documents

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State of 224Gb in SFF

SFF manages two families of specifications: SFP and QSFP

QSFP: 224G updates in process

- SFF-8665: QSFP Transceivers
  - Draft 1.9.8 released. Close to publication.
- SFF-TA-1027: Connector, Cage, Pluggable Module
  - Draft 1.0.5 released. Working through changes before starting approval process
- SFF-8679: General Electrical
  - Published 1.9 to cover 224G

SFP: Updates not started

- SFF-8402: SFP Transceivers
  - R1.2 included 112G. 224G timeline TBD
- SFF-TA-1031: Connector, Cage, Pluggable Module
  - R1.0 supports 112G. 224G timeline TBD
- SFF-8419: General Electrical
  - 112 updates in process. 224G timeline TBD
- SFF-8472: Management Interface
  - Draft 12.4.3. Close to publication.

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SFF TWG Participation

- We are solving problems around higher speed Ethernet and PCIe interconnects to solve AI bottleneck problems while improving existing interconnects and form factors.
- Our members include participants involved in ASICs/CPUs, Data centers, interconnects, networking, research, server systems, storage devices, test equipment, and transceivers.
- 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
- Resources:
  - Public Site: https://www.snia.org/sff
  - Specifications: https://www.snia.org/sff/specifications
  - Additional questions? Please send mail to sfftwgchair@snia.org