SFF-8024

Specification for

SFF Module Management Reference Code Tables

Rev 4.13.2 ~~July~~ April 7th~~11~~, 202~~5~~6

SECRETARIAT: SFF TWG

This draft specification is made available for public review at https://www.snia.org/sff/specifications. Comments may be submitted at https://www.snia.org/feedback. Comments received will be considered for inclusion in future revisions of this specification.

This document has been released by SNIA. The SFF TWG believes that the ideas, methodologies, and technologies described in this document are technically accurate and are appropriate for widespread distribution.

ABSTRACT: This draft ~~–~~specification provides codes for module identifiers, encoding values, connector types, extended compliance codes, host electrical and module media interfaces, transceiver subtypes, fiber face and heatsink types.

This draft specification is the reference source for identifiers assigned to interpret the memory maps of self-identifying modules.

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Foreword

The development work on this specification was done by the SNIA SFF TWG, an industry group. Since its formation as the SFF Committee in August 1990, the membership has included a mix of companies which are leaders across the industry.

For those who wish to participate in the activities of the SFF TWG, the signup for membership can be found at https://www.snia.org/join.

Revision History

Rev 0.7	- Table 3-1 changed per comments received during ballot - Figure 3-3 example added
Rev 0.8	- As requested by Transceiver SSWG, added color to Figure 3-3
Rev 0.9	- As requested, filled in more cells for SFP+ and CXP.
Rev 1.0	- Corrected CXP 802.3ba as applicable to SFF-8647
Rev 1.1	- Removed logo on connectors in Figure 3-1 and Figure 3-2
Rev 1.2	- Changed '>' to 'and' in Table 3-1 - Added table for Identifier Values as per Transceiver SSWG - Added table for Encoding Values
Rev 1.3	- Added SFP+ 4 Gb/s to Table 3-1
Rev 1.4	- Expanded the Identifier Values table - Added table for Specification Compliance Codes - Added table for Extended Specification Compliance Codes
Rev 1.5	- Expanded single sentence about SFF-8063 to a paragraph with emphasis
Rev 1.6	- Identified superseded specifications in Table 3-1
Rev 1.7	- Expanded HD to include unshielded and add 24 Gb/s
Rev 1.8	- Aligned SFP naming w/QSFP nomenclature
Rev 1.9	- Added 0Bh to the Extended Specification Compliance Codes
Rev 2.0	- Changed SFP Common Management Spec to SFF-8472 - Deleted 802.3bj from 28 Gb/s CXP
Rev 2.1	- Aligned CXP and HD naming w/QSFP nomenclature
Rev 2.2	- Replaced duplicated codes 08-0Ah in the Extended Specification Compliance Codes - Clarified active cable and CWDM4 codes
Rev 2.3	- Expanded 0Bh in Identifier Values to include SFP+ - Added 13-16h to the Extended Specification Compliance Codes - The Encoding Values which were thought to be common between SFF-8472 and SFF-8636 are not. The table was deleted and restored to SFF-8636. - The Specification Compliance Codes are not subject to change. The table was deleted and restored to SFF-8636.
Rev 2.4	- Added 13h to Identifier Values
Rev 2.5	- Restored the Encoding Values from SFF-8472 and SFF-8636 - Added Connector Types from SFF-8472 and SFF-8636 - Added 07h to Encoding Values - Added 0Dh and 24h to Connector Types - Split Table 3-1 Integrated Pluggable Solution specifications which were referenced by another Integrated Pluggable Solution: o SFF-8084 reference changed to SFF-8071 o SFF-8431 reference changed to SFF-8419 o SFF-8643 reference changed to SFF-8613 o SFF-8644 reference changed to SFF-8614 o SFF-8647 reference changed to SFF-8617
Rev 2.6	- Added note in 4.1 about overlap with CFP MSA codes - Removed IEEE references from CXP rows
Rev 2.7	- Added 14-15h Fanouts to Identifier Values
Rev 2.8	- Added specification numbers for QSFPx management

	- Added SFF-8418 to Table 3-1
	- Added 16h 10GBASE-T with SFI electrical interface to Extended Specification Compliance
Rev 2.9	Codes
Rev 3.0	- Added 17h QSFP28 100G CLR4 to Extended Specification Compliance Codes
Rev 3.1	- Renamed Table 3-1 and added Table 3-2 Device Connectors
Rev 3.2	- Renamed Mini-SAS HD as Mini Multilane HD in Figure 3-2
	- Updated Identifier Values with backward compatible cables and modules
	- Added 25G Ethernet and AOC, ACC equivalents to Extended Specification Compliance Codes
Rev 3.3	- Added Extended SCC 17h microQSFP
Rev 3.4	- Added Extended SCC 1Ah 2 lambda DWDM 100G
	- Added Encoding Value 08h PAM4
Rev 3.5	- Replaced Table 3-2
Rev 3.6	- Removed reference to SFF-8436 for Extended Compliance Codes in 4
Rev 3.7	- Corrected entries for CWDM4
Rev 3.8	- Added 25GBASE to 03h and 04h 100GBASE
Rev 3.9	- *14-Mar-16*
	- Changed 1Ah acronym to 100GE-DWDM2 and added description
Rev 4.0	- *27-Jun-16*
	- Added new codes 1Bh-20h in Extended compliance codes Table 4-4
Rev 4.2	- Added new code 21h (100G PAM4 BiDi) in Extended compliance code Table 4-4
Rev 4.3	- Added new code 19h for OSFP in Identifier values Table 4-1
	- Added new code 22h for 4WDM-10 MSA in Table 4-4
	- Added new code 23h for 4WDM-20 MSA in Table 4-4
	- Added new code 24h for 4WDM-40 MSA in Table 4-4
Rev 4.4	- *11-Jun-17*
	- Incorporated changes from June 7 2017 meeting including:
	- Deleted all references to Seagate FTP site
	- Restructured Table 3-1
	- Updated Fig 3-3
	- Added multi-lane text to section 4.4
	- Changed ANSI reference to INCITS
Rev 4.5	- *29-Jun-18*
	- Updated Tables 3-1, 3-2
	- Added new code 1Ah for SFP-DD in Table 4-1
	- Added new codes for CS and mini CS connectors to Table 4-3
	- Added new codes for 50G/lane and 100G PMDs in Table 4-4
	- Added new codes for 64GFC and 128GFC in Table 4-4
	- Added Module-Host Electrical Interface Codes as Table 4-5
Rev 4.6	- *8-Mar-19*
	- Changed name from 'SFF Cross Reference to Industry Products' to 'SFF Module Management Reference Code Tables'
	- Deleted Tables 3-1, 3-2 (See REF-TA-1011)
	- Added new Module Media code Tables 4-6,7,8,9,10
	- Updated Module-Host Electrical Interface Codes Table 4-5
	- Added codes for DSFP, x4 MiniLink/OCuLink, x8 MiniLink, QSFP with CMIS (Table 4-1)
	- Reworded description of 0Dh code in Table 4-1

- Added text to note 2 in Table 4-1
- Added note 1 in Table 4-5
- Corrected BER from 2.4x10-6 to 2.6x10-6 in Table 4-9
- Added code for active cable with BER <10-6 in Table 4-9

Rev 4.7
- *8-Jan-20*
- Changed editor's name and contact information
- Added missing abbreviation descriptions
- Changed XPAK name in the Abbreviation Section
- Added new specifications in Section 2.1 – Industry documents
- Formatted the reference to the document sources as a table in Section 2.2
- Made additions to the Module Form Factor Table 3-1
- In the overview in Section 4.1 corrected the referenced CMIS bytes and added the secondary Extended Specification Compliance byte location from SFF-8636
- Deleted lines for unused codes in Table 4-1
- Changed definition of value 26h in Table 4-3 to new connector name
- Added new codes 0Bh/0Ch/0Dh for 50GBASE-CR2 variants in Table 4-4
- Changed the names of codes 26h and 27h in Table 4-4
- Added new codes 41h/42h for CAUI-4 C2M and 43h/44h/45h for 50GBASE-CR2 in Table 4-5
- Changed the description of codes 3Dh-40h as per CMIS change in Table 4-5
- Changed definition for code 1Ah, 11h and 12h in Table 4-6
- Added new codes 40h/41h/42h for 50GBASE-ER/200GBASE-ER4/400GBASE-ER8 and codes 3Eh/3Fh for OIF Coherent modules in Table 4-7
- Edited definitions for OTN codes 2Ch-33h in Table 4-7
- Added new code 43h in Table 4-7 for 400GBASE-LR4-6, changed the name of 1Eh to 400G-LR4-10, changed the description of codes 15h,16h,1Dh
- Changed the titles for Tables 4-8 and 4-9 to include passive and active loopbacks and added new codes BFh for loopback modules

Rev 4.8
- *30-Nov-20*
- Added new codes 0Eh, 28h, 29h, 2Ah, 2Bh, 3Fh, 47h, 48h, 49h for 10Mb/s in Table 4-4
- Deleted BER options for 100GBASE-FR1 and 100GBASE-LR1 in Table 4-4
- Added new code 79h for 256GFC and codes 80h and 81h for 64GFC and 128GFC in Table 4.4. Removed previous FC entries for codes 50h-55h
- Added new codes 70h, 71h, 72h, 73h and 74h in table 4-5. Added a note to point out some values in this table are rounded
- Changed "Application Name" header in Table 4-5 to "Specification"
- Changed B/sym to B/UI in the headers for Tables 4-5, 4-6, 4-7 and 4-10. Added UI in list of abbreviations
- Added rate entries for n100GBASE-CRn and family in Table 4-5
- Changed InfiniBand aggregate data rates to values to two decimal places
- Changed heading in Table 4-6 and Table 4-7 from "Application Name" to "Module Media Interface"
- Added new code 1Bh, modified the Application name for codes 0Dh and 11h in Table 4-6 Corrected Signaling Rate for 100GBASE-SR in Table 4-6. Added rates for 800G-SR8.
- Added codes 44h and 45h in Table 4-7. Reclaimed codes for non-utilized Single mode media types 25h and 27h, reverted to Reserved

Rev 4.9
- *24-May-21*
- Added codes 37h, 38h, 39h in Table 4-4 for 10GBASE-BR, 25GBASE-BR, 50GBASE-BR
- Added codes 78h, 79h and 80h in Table 4-7 for 10GBASE-BR, 25GBASE-BR, 50GBASE-BR
- Added Clause 167 to 100GBASE-SR family in Table 4-4
- Added code 36h for 100GBASE-VR in Table 4.4

- Added codes 1Dh, 1Eh and 1Fh for x00GBASE-VRx family in Table 4-6
- Added codes 2Ch, 2Dh, 2Eh, 2Fh, 34h, 35h in Table 4-4 for 100GBASE-LR and -ER family products. Added new codes in Table 4-7 4Ah, 4Bh and 4Ch
- Added code 4Ah for 50GBASE-ER in Table 4-4 and a note for the Fibre Channel codes
- Changed the column header for 4-5, 4-6, 4-7 and 4-10 to Application Bit Rate and the name for Table 4-5 to Host Electrical Interface ID
- Added codes 4Bh to 50h for 100GAUI-1-S and -L in Table 4-5
- Corrected names for 25GBASE-CR family in Table 4-5
- Moved entries for BASE-T from Table 4-5 to Table 4-10
- Corrected number of lanes for 400GBASE-SR8 in Table 4-6
- Added codes 46h to 49h Table 4-7 for OpenZR+ family
- Added code 4Dh in Table 4-7 and code 4Ch in Table 4-4 for 400GBASE-ZR
- Added P802.3cp, P802.3db, FC-PI-8 (draft?) in Section 2.1, Industry Documents
- Added Ethernet Technology Consortium in Table 2-1
- Changed the Application Bit Rate for codes 62 and 63 in Table 4-7 to 478.75.

Rev 4.10 *24-Nov-22*

- Added CMIS as option for SFP-DD in Table 3-1
- Modified description for code 1Ah in Table 4-1
- Added code 1Fh in Table 4-1
- Added Table 4-12 Fiber Face Type codes
- Added code 53h in Table 4-5, changed specification reference for code 49h in Table 4-5
- Added code 20h in Table 4-6
- Added codes 51h-58h in Table 4-7
- Added Table 4-11 Transceiver Subtypes Codes
- Changed 100GBASE-VR to 100GBASE-VR1 and 100GBASE-SR to 100GBASE-SR1
- Updated IEEE802.3 documents in 2.1 Industry documents
- Clarified AOC and ACC where used with retimer

Rev 4.11 *26-Nov-23*

- In Section 2.1 added OIF-ELSFP, OSFP, OSFP-XD, OpenROADM, Open ZR+, Terabit BiDi MSA, INF-TA-1003, SFF-TA-1032
- Added OpenROADM, OpenZR+ and Terabit BiDi MSA in Table 2-1
- Added ELSFP and OSFP-XD acronyms in Section 2.4.2
- Added codes 21h,22h, 23h, 24h, 25h in Table 4-1
- Added ELSFP and OSFP-XD in Table 3-1
- Updated IEEE references in Table 4-4
- Added codes 30h, 31h, 55h, 56h, 70h, 71h, 72h, 73h, 80h, 87h, 88h, A0h to Table 4-5. Allocated reserved codes for each group.
- Added codes 33h-36h in Table 4-6
- Added codes 35h-37h and 58h-63h in Table 4-7
- Added Note 1 in Table 4-12.

Rev 4.12 *9-Jul-24*

- Added Open XR Optics Forum in Table 2-1 Industry Standards and Specifications
- Added code 74h and codes 81h-83h (200G/lane) in Table 4-5, modified code 80h
- Added codes 64h-72h and 73h-81h (200G/lane) in Table 4-7
- Added code C0h in Table 4-8.

Rev 4.13 *10-Jul-25*

- Added LPO-MSA Linear Pluggable Optics in Section 2-1
- Added QSFP-DD800, QSFP-DD1600, OSFP800, OSFP1600, OSFP-RHS, OSFP-XD800, OSFP-XD1600, OSFP-XD-RHS in Table 3-1
- Added code 20h-24h, 90h-97h, B0h-B2h in Table 4-5
- Removed code 54h from Table 4-5

- Added codes 87h-92h in Table 4-7
- Edited descriptions for codes 66h, 68h, 6Ah, 6Bh in Table 4-7
- Removed "placeholder" in the description of codes 6Ch-6Eh in Table 4-7
- Added Table 4-13 for OSFP/OSFP-XD Heatsink type
- Updated industry standards websites
- Added additional CMIS registers in the text about usage of various tables
- Editorial changes.

Rev 4.13.1 1-Apr-26

- Added SFF-TA-1039 to Section 2.1 Industry documents
- Changed reference to Annex 176D from Anex 176E for codes 80h- 83h in Tabe 4-5
- Added codes 98h-9Bh, B3h, B4h, B5h and B6h in Table 4-5
- Changed Clause reference for code 80h to Clause 182 in Table 4-7
- Changed the names of Tables 4-5, 4-6 and 4-7 to indicate Interface Group ID of 0. Added clarifying text to code BEh in all three tables to refer to the Unique ID values defined in CMIS to extend the range of codes for future use.
- Added reference to the XPO MSA specification, added XPO to Table 2-1, 3-1 and a code 26h in Table 4-1

Rev 4.13.2 7-Apr-26

- Added code 93h in Table 4-7.

Contents

Figures

Tables

1. Scope

This specification defines the SFF Module Management Reference Codes. This specification provides codes for module identifiers, encoding values, connector types, extended compliance codes, host electrical interface and module media interface. These codes are used to advertise module capabilities in a module memory map.

2. References, Conventions, Keywords, Definitions

2.1 Industry Documents

- 100G 4WDM-10 MSA Technical Specification
- 100G SWDM4 MSA Technical Specifications
- 100G-FR and 100G-LR Technical Specifications
- 25G & 50G Specification of the 25 Gigabit Ethernet Consortium
- 400G-FR4 Technical Specification
- 400G-LR4-10 Technical Specification
- 40G SWDM4 MSA Technical Specifications
- CLR4 - Replaced in the market by CWDM4 Technical Specification
- CPRI V7.0
- IEEE Std 802.3, IEEE Std 802.3db, IEEE Std 802.3ck, IEEE Std 802.3df
- INCITS 417 SAS-1.1 (Serial Attached SCSI - 1.1)
- INCITS 457 SAS-2 (Serial Attached SCSI - 2)
- INCITS 478 SAS-2.1 (Serial Attached SCSI - 2.1)
- INCITS 519 SAS-3 (Serial Attached SCSI - 3)
- INCITS 534 SAS-4 (Serial Attached SCSI - 4)
- INCITS FC-PI-4, FC-PI-5, FC-PI-6, FC-PI-6p, FC-PI-7, FC-PI-8
- INF-8077 XFP 1X 10 Gb/s Pluggable Module
- INF-8438 QSFP 4X 4 Gb/s Transceiver (Quad SFP)
- INF-TA-1003 400 Gb/s (16 x 25 Gb/s) Pluggable Transceiver
- InfiniBand Architecture Specification Volume 2
- ITU-T G.709/Y.1331
- ITU-T G.Sup58
- LPO-MSA Linear Pluggable Optics
- microQSFP Specification
- OSFP Octal Small Form Factor Pluggable Module specification
- OSFP-XD Octal Small Form Factor Extra Dense Pluggable Module specification
- OpenROADM MSA Optical specifications
- Open XR Optics Forum
- OpenZR+ MSA
- OIF-CMIS Common Management Interface Specification
- OIF-ELSFP External Laser Small Form Factor Pluggable Implementation Agreement-
- QSFP-DD Hardware Specification for QSFP Double Density 8X Pluggable Transceiver
- REF-TA-1011 Cross Reference to Select SFF Connectors and Modules
- SFF-TA-1032 Multi-Lane External High Speed Cable System
- SFF-TA-1039 PCIe OptiLink Hardware and Electrical Specification
- SFF-8071 SFP+ 1X 0.8mm Card Edge Connector
- SFF-8081 SFP+ 1X 16 Gb/s Pluggable Transceiver Solution (SFP16)
- SFF-8083 SFP+ 1X 10 Gb/s Pluggable Transceiver Solution (SFP10)
- SFF-8084 SFP+ 1X 4 Gb/s Pluggable Transceiver Solution
- SFF-8402 SFP+ 1X 28 Gb/s Pluggable Transceiver Solution (SFP28)
- SFF-8418 SFP+ 10 Gb/s Electrical Interface
- SFF-8419 SFP+ Power and Low Speed Interface
- SFF-8432 SFP+ Module and Cage
- SFF-8433 SFP+ Ganged Cage

- SFF-8436 QSFP+ 4X 10 Gb/s Pluggable Transceiver
- SFF-8449 Management Interface for SAS Shielded Cables
- SFF-8472 Management Interface for SFP+
- SFF-8482 Serial Attachment 2X Unshielded Connector
- SFF-8613 Mini Multilane 4/8X Unshielded Connector (HDun)
- SFF-8614 Mini Multilane 4/8X Shielded Cage/Connector (HDsh)
- SFF-8617 Mini Multilane 12X Shielded Cage/Connector (CXP)
- SFF-8630 Serial Attachment 4X 12 Gb/s Unshielded Connector
- SFF-8635 QSFP+ 4X 10 Gb/s Pluggable Transceiver Solution (QSFP10)
- SFF-8636 Management Interface for 4-lane Modules and Cables
- SFF-8639 Multifunction 6X Unshielded Connector
- SFF-8640 Serial Attachment 4X 24 Gb/s Unshielded Connector
- SFF-8642 Mini Multilane 12X 10 Gb/s Shielded Connector (CXP10)
- SFF-8643 Mini Multilane 4/8X 12 Gb/s Unshielded Connector (HD12un)
- SFF-8644 Mini Multilane 4/8X 12 Gb/s Shielded Cage/Connector (HD12sh)
- SFF-8647 Mini Multilane 12X 14 Gb/s Shielded Cage/Connector (CXP14)
- SFF-8648 Mini Multilane 12X 28 Gb/s Shielded Cage/Connector (CXP28)
- SFF-8661 QSFP+ 4X Pluggable Module
- SFF-8662 QSFP+ 4X Connector (Style A)
- SFF-8663 QSFP+ Cage (Style A)
- SFF-8665 QSFP+ 4X 28 Gb/s Pluggable Transceiver Solution (QSFP28)
- SFF-8672 QSFP+ 4X Connector (Style B)
- SFF-8678 Serial Attachment 2X 6 Gb/s Unshielded Connector
- SFF-8679 QSFP+ 4X Base Electrical Specification
- SFF-8680 Serial Attachment 2X 12 Gb/s Unshielded Connector
- SFF-8681 Serial Attachment 2X 24 Gb/s Unshielded Connector
- SFF-8682 QSFP+ 4X Connector
- SFF-8683 QSFP+ Cage
- SFF-8685 QSFP+ 4X 14 Gb/s Pluggable Transceiver Solution (QSFP14)
- SFP-DD Hardware Specification for SFP Double Density 2X Pluggable transceiver
- SFP-DD Management interface specification
- Terabit BiDi MSA Technical Specification
- XPO Extra-dense Pluggable Optics specification

2.2 Sources

The complete list of SFF documents which have been completed, are currently being worked on, or that have been expired by the SFF Committee can be found at https://www.snia.org/sff/specifications. Suggestions for improvement of this specification will be welcome, they should be submitted to https://www.snia.org/feedback.

Copies of the standards and specifications can be obtained from the organizations' websites listed below:

Table 2-1 Sources for Industry Standards and Specifications

Standards and Specifications	Organization	Website
100G CWDM and 100G 4WDM Specifications	CWDM4 MSA	www.cwdm4-msa.org
100G-FR, 100G-LR, 400G-FR4 and 400G-LR4-10 Specifications	100G Lambda MSA	http://100glambda.com/
25G and 50G Specifications, 400G Auto-negotiation Specification for 400GBASE-CR8/KR8, 800 Gigabit Ethernet Specification	Ethernet Technology Consortium (formerly 25G Gigabit Ethernet Consortium)	https://ethernettechnologyconsortium.org/
40G and 100G SWDM4 Specifications	SWDM Alliance	www.SWDM.org
DSFP and ACMIS Specifications	DSFP MSA	http://dsfpmsa.org/
Electronic Industry Alliance (EIA)	Electronic Components Industry Association (ECIA)	https://www.ecianow.org
IEEE 802 standards	Institute of Electrical and Electronics Engineers (IEEE)	https://ieeexplore.ieee.org/browse/standards/get-program/page/series?id=68 or https://www.ieee.org
INCITS/Fibre Channel	International Committee for Information Technology Standards (INCITS)	https://www.incits.org/standards-information/purchase-standards-or-download-dpans
InfiniBand	InfiniBand Trade Association (IBTA)	https://www.infinibandta.org
LPO Specification	LPO MSA	https://www.lpo-msa.org/home/specifications-and-white-papers.html
microQSFP Specification	microQSFP MSA	http://www.microqsfp.com/
OIF Implementation Agreements including CMIS	Optical Internetworking Forum	https://www.oiforum.com/technical-work/implementation-agreements-ias/
Open XR Optics	Open XR Optics Forum	https://openxropticsforum.org/
OpenZR+	OpenZR+ MSA	https://openzrplus.org
Open ROADM Specifications	Open ROADM MSA	http://www.openroadm.org
OSFP Specifications	OSFP MSA	www.osfpmsa.org
PCIe	PCI-SIG	http://pcisig.com
QSFP-DD Specification	QSFP-DD MSA	http://www.qsfp-dd.com/
SAS	International Committee for Information Technology Standards (INCITS)	https://www.incits.org/standards-information/purchase-standards-or-download-dpans

SFP-DD and SFP-DD Management Specifications	SFP-DD MSA	www.sfp-dd.com
Terabit BiDi MSA Technical Specification	Terabit BiDi MSA	https://terabit-bidi-msa.com/
XPO Specification	XPO MSA	www.xpomsa.com

2.3 Conventions

The following conventions are used throughout this document:

DEFINITIONS

Fanout Cable: A single connector cable assembly which splits into a number of connectors at the other end.

NUMBERING CONVENTIONS

The ISO convention of numbering is used i.e., the thousands and higher multiples are separated by a space and a period is used as the decimal point. This is equivalent to the English/American convention of a comma and a period.

American	French	ISO
0.6	0,6	0.6
1000	1 000	1 000
1,323,462.90	1 323 462,9	1 323 462.9

2.4 Keywords, Acronyms, and Definitions

For the purposes of this document, the following keywords, acronyms, and definitions apply.

2.4.1 Keywords

May/may not: A keyword that indicates flexibility of choice with no implied preference.

Obsolete: A keyword indicating that an item was defined in prior specifications but has been removed from this specification.

Reserved: A keyword used for defining the signal on a connector contact [when] its actual function is set aside for future standardization. It is not available for vendor specific use. Where this term is used for bits, bytes, fields, and code values; the bits, bytes, fields, and code values are set aside for future standardization. The default value shall be zero. The originator is required to define a Reserved field or bit as zero, but the receiver should not check Reserved fields or bits for zero.

Shall: A keyword indicating a mandatory requirement. Designers are required to implement all such mandatory requirements to ensure interoperability with other products that conform to this specification.

Should: A keyword indicating flexibility of choice with a strongly preferred alternative.

Vendor specific: A keyword indicating something (e.g., a bit, field, code value) that is not defined by this specification. Specification of the referenced item is determined by the manufacturer and may be used differently in various implementations.

2.4.2 Acronyms and Abbreviations

4WDM:	4 Wavelength Division Multiplexing
AOC:	Active optical cable
BNC:	Bayonet Neill-Concelman
CAUI:	100G Attachment Unit Interface
CDFP:	16 Lane Form Factor Pluggable Module
CLR4:	CLR4 alliance
CMIS:	Common Management Interface Specification
CS:	Corning/Senko
CXP:	100G 12 lane Pluggable Module
ACC:	Active Copper Cable
DSFP:	Dual Small Form Factor Pluggable
DWDM:	Dense Wavelength Division Multiplexing
ELSFP:	External Laser Small Form Factor Pluggable
GBIC:	Gigabit Interface Converter
GID:	Group Interface ID
HSSDC:	High Speed Serial Data Connector
LC:	Lucent Connector
LPO:	Linear Pluggable Optics
MPO:	Multi-fiber Push-On connector
MT-RJ:	Mechanical transfer registered jack connector
MU:	Miniature unit connector
MXC:	Multi-media eXtension Connector
OSFP:	Octal Small Form Factor Pluggable
OSFP-RHS	Octal Small Form Factor Pluggable Riding Heat Sink
OSFP-XD:	Octal Small Form Factor Extra Dense Pluggable
OSFP-XD-RHS	Octal Small Form Factor Extra Dense Pluggable Riding Heat Sink
PAM4:	Pulse Amplitude Modulation 4 levels
PSM4:	Parallel Single Mode 4 lane
QSFP:	Quad Small Form Factor Pluggable
QSFP-DD:	Quad Small Form Factor Pluggable Double Density
RJ45:	Registered jack 45 connector
SC:	Standard connector
SFI:	SFP+ high speed electrical interface
SFP:	Small Form Factor Pluggable
SFP-DD:	Small Form Factor Pluggable Double Density
SG:	Second generation connector
SWDM:	Shortwave wavelength division multiplexed
TNC:	Threaded Neill-Concelman
UI:	Unit Interval
X2:	10G Form Factor pluggable
XAUI:	10 lane Attachment Unit Interface
XENPAK:	10Gbit Ethernet transceiver Package
XFF:	(Obsolete)
XFF-E:	(Obsolete)
XFI:	XFP high speed electrical Interface
XFP:	10G Form Factor Pluggable
XPAK:	10G Form Factor pluggable transceiver package
XPO:	Extra-dense Pluggable Optics

2.4.3 Definitions

Connector: Each half of an interface that, when joined together, establish electrical contact and mechanical retention between two components. In this specification, the term connector does not apply to any specific gender; it is used to describe the receptacle, the plug or the card edge, or the union of receptacle to plug or card edge. Other common terms include: connector interface, mating interface, and separable interface.

Module: In this specification, module refers to:

1) an assembly that is terminated with a plug (See Figure 2-1~~Figure 2-1~~) at the end of a cable assembly (active or passive copper) or an active optical cable (AOC) intended to mate to a receptacle.

or

2) an optical transceiver typically inserted into a front panel socket that connects to the electrical interface of the system with a plug (See Figure 2-1~~Figure 2-1~~) and the optical interface of the outside world.

Plug: A term used to describe the connector that contains the penetrating contacts of the connector interface as shown in Figure 2-1~~Figure 2-1~~. Plugs typically contain stationary contacts. Other common terms include male, pin connector, and card edge.

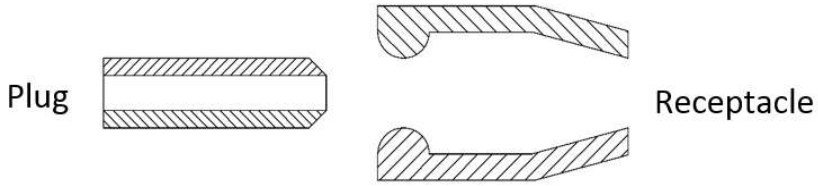

Figure 2-1 Plug and Receptacle Definition

Receptacle: A term used to describe the connector that contains the contacts that accept the plug contacts as shown in Figure 2-1~~Figure 2-1~~. Receptacles typically contain spring contacts. Other common terms include female and socket connector.

3. General Description

3.1 Configuration Overview/Descriptions

This specification provides reference tables for pluggable modules. These tables are updated with additional codes reflecting industry developments.

Revisions 4.5 and earlier of this specification provided a tabular representation of pluggable I/O configurations along with the naming conventions that were used. This content is now provided in REF-TA-1011 "Cross Reference to Select SFF Connectors and Modules".

To request the addition of a code, send the following information to the contacts on page 1 of this document. The request should include the following:
1) Relevant table
2) Recommended information (form factor name, management interface name) to include in table
3) Publicly available reference specification e.g. data sheet or MSA specification

The relation between module form factors and management interface specifications is shown in Table 3-1.

Table 3-1 Module form factors and management interface specifications

Form factor	Management interface specification
SFP+/SFP28 and later	SFF-8472 or CMIS
QSFP+	SFF-8436
QSFP+/QSFP28 and later	SFF-8636 or CMIS
QSFP-DD/QSFP-DD800/QSFP-DD1600	CMIS
OSFP/OSFP800/OSFP1600	CMIS
OSFP-RHS	CMIS
OSFP-XD/OSFP-XD800/OSFP-XD1600	CMIS
OSFP-XD-RHS	CMIS
SFP-DD	SFP-DD Management interface specification or CMIS
MicroQSFP	SFF-8436
OIF-ELSFP	CMIS
XPO	CMIS

4. Transceiver or Cable Management

4.1 Overview

Self-identifying information is provided by modules or cables that use the 2-wire interface-based management interfaces listed in Table 3-1.

The information is kept current if the developers of new modules and the standards incorporating new speeds and technologies request updates to the tables.

The tables below are not static. They have been removed from the subject specifications (listed below) to prevent multi-revisions with no new technical content.

To request a new identifier (Table 4-1~~Table 4-1~~), encoding mechanism (Table 4-2~~Table 4-2~~), connector type (Table 4-3~~Table 4-3~~), compliance code (Table 4-4~~Table 4-4~~), host electrical interface code (Table 4-5~~Table 4-5~~) or module media interface code (Tables 4-6 to 4-10) please send an email request to points of contact listed on title page.

The tables below are referenced by the various specifications because either the content is common, or the contents are regularly updated. Maintaining the tables in SFF-8024 avoids having to revise specifications for non-technical changes. Examples of the registers for each table are shown here. In the event of a conflict between this list and the usage in any specification, that specification takes precedence.

Table 4-1 Identifier Values
- SFF-8472 Page 00h, Byte 0
- SFF-8636 and CMIS Page 00h, Byte 0 and Page 00h, Byte 128

Table 4-2 Encoding Values
- SFF-8436, SFF-8636 Page 00h Byte 139
- SFF-8472 Page 00h, Byte 11

Table 4-3 Connector Types
- SFF-8436, SFF-8636 Page 00h, Byte 130
- SFF-8472 Page 00h, Byte 2
- CMIS Page 00h, Byte 203

Table 4-4 Extended Specification Compliance Codes
- SFF-8636 Page 00h, Byte 192 and Page 00h, Byte 116
- SFF-8472 Page 00h, Byte 36

Table 4-11 Transceiver Subtype codes
- SFF-8636 Page 00h, Byte 117
- CMIS Lower Memory, Byte 60, bits 0 to 3

Table 4-12 Fiber Face Type Codes
- SFF-8636 Page 00h, Byte 117
- CMIS Lower Memory, Byte 61, bits 0 to 1

The following tables provide codes for the various host electrical interface and optical or other media interface specifications that may apply to pluggable modules. Separate codes for the electrical and media interfaces enable modules to identify the specific combination of electrical and media specifications that the module supports. Codes for publicly available networking industry specifications are included.

Table 4-5 Host Electrical Interface Codes
- CMIS Lower Memory, bytes 86, 90, 94, 98, 102, 106, 110, 114, 223, 227, 231, 235, 239, 243, 247
- CMIS Page 1Ch, Normalized Application Descriptors

Table 4-6 to Table 4-10 Module Media Interface Codes
- CMIS Lower Memory, bytes 87, 91, 95, 99, 103, 107, 111, 115, 224, 228, 232, 236, 240, 244, 248
- CMIS Page 1Ch, Normalized Application Descriptors

4.2 Transceiver References

The Identifier Value assigned to the combination of memory map and module is essential to interpreting the contents of the memory map.

Table 4-1 Identifier Values

Value	Description of Module, with memory map type if not unique
00h	Unknown or unspecified
01h	GBIC
02h	Module/connector soldered to motherboard (using SFF-8472)
03h	SFP/SFP+/SFP28 and later with SFF-8472 management interface
04h	300 pin XBI
05h	XENPAK
06h	XFP
07h	XFF
08h	XFP-E
09h	XPAK
0Ah	X2
0Bh	DWDM-SFP/SFP+ (not using SFF-8472)
0Ch	QSFP (INF-8438)
0Dh	QSFP+ or later with SFF-8636 or SFF-8436 management interface (SFF-8436, SFF-8635, SFF-8665, SFF-8685 et al.) [1]
0Eh	CXP or later
0Fh	Shielded Mini Multilane HD 4X
10h	Shielded Mini Multilane HD 8X
11h	QSFP28 or later with SFF-8636 management interface (SFF-8665 et al.) [2]
12h	CXP2 (aka CXP28) or later
13h	CDFP (Style 1/Style2) INF-TA-1003
14h	Shielded Mini Multilane HD 4X Fanout Cable
15h	Shielded Mini Multilane HD 8X Fanout Cable
16h	CDFP (Style 3) INF-TA-1003
17h	microQSFP
18h	QSFP-DD Double Density 8X Pluggable Transceiver
19h	OSFP 8X Pluggable Transceiver
1Ah	SFP-DD Double Density 2X Pluggable Transceiver with SFP-DD Management Interface Specification
1Bh	DSFP Dual Small Form Factor Pluggable Transceiver
1Ch	x4 MiniLink/OcuLink
1Dh	x8 MiniLink
1Eh	QSFP+ or later with Common Management Interface Specification (CMIS)
1Fh	SFP-DD Double Density 2X Pluggable Transceiver with Common Management Interface Specification (CMIS)
20h	SFP+ and later with Common Management Interface Specification (CMIS)
21h	OSFP-XD with Common Management interface Specification (CMIS)
22h	OIF-ELSFP with Common Management interface Specification (CMIS)
23h	CDFP (x4 PCIe) SFF-TA-1032 with Common Management interface Specification (CMIS)
24h	CDFP (x8 PCIe) SFF-TA-1032 with Common Management interface Specification (CMIS)
25h	CDFP (x16 PCIe) SFF-TA-1032 with Common Management interface Specification (CMIS)
26h	XPO
2~~7~~6h-7Fh	Reserved
80-FFh	Vendor Specific

1. 0Dh is the preferred coding, it supports multi-speed implementations and provides backward compatibility
2. 11h may prevent the use of new 25G-class modules on old hosts. Not recommended for new designs

NOTE: The Identifier Values assigned by the CFP MSA overlap with the above, and this should not be an issue because CFP does not use I2C for the management protocol, it uses MDIO. Software which bases actions on Identifier Values needs to recognize that synonyms exist and qualify the values by the management protocol.

For some transceiver types, an additional subtype identifier can be used to provide information to the host on mechanical and thermal implementation. Codes are listed in Table 4-11 for each type of transceiver. Refer to the hardware specifications for more information on the listed subtypes.

4.3 Encoding References

The values established by SFF-8436 and SFF-8636 are similar but not identical to those assigned by SFF-8472. Maintaining a single reference will prevent further divergence.
Encoding values are primarily intended for the host interface.

Table 4-2 Encoding Values

Description of Encoding mechanism	Modules		
	8472	Common	8436/8636
Unspecified		00h	
8B/10B		01h	
4B/5B		02h	
NRZ		03h	
Manchester	04h		06h
SONET Scrambled	05h		04h
64B/66B	06h		05h
256B/257B (transcoded FEC-enabled data)		07h	
PAM4		08h	
Reserved		09h-FFh	
Note: For modules supporting multiple encoding types, the primary product application dictates the value chosen e.g. for Fibre Channel 16G/8G/4G or Ethernet 10G/1G, the value of 64B/66B should be chosen. In case of a conflict between modulation and coding, use the code for modulation. E.g., for 200GAUI-4 use code for PAM4.			

4.4 Connector References

The media side connector codes listed in Table 4-3 are used by SFF-8436, SFF-8472, SFF-8636 and CMIS management interfaces. Maintaining a single reference will prevent divergence.

When applicable, the codes listed in **Error! Reference source not found.**~~Table 4-12~~ are used to identify the fiber face type for the specific connector type.

Table 4-3 Connector Types

Value	Description of Media Connector
00h	Unknown or unspecified
01h	SC (Subscriber Connector)
02h	Fibre Channel Style 1 copper connector
03h	Fibre Channel Style 2 copper connector
04h	BNC/TNC (Bayonet/Threaded Neill-Concelman)
05h	Fibre Channel coax headers
06h	Fiber Jack
07h	LC (Lucent Connector)
08h	MT-RJ (Mechanical Transfer – Registered Jack)
09h	MU (Multiple Optical)
0Ah	SG
0Bh	Optical Pigtail
0Ch	MPO 1x12 (Multifiber Parallel Optic)
0Dh	MPO 2x16
0Eh-1Fh	Reserved
20h	HSSDC II (High Speed Serial Data Connector)
21h	Copper pigtail
22h	RJ45 (Registered Jack)
23h	No separable connector
24h	MXC 2x16
25h	CS optical connector
26h	SN (previously Mini CS) optical connector
27h	MPO 2x12
28h	MPO 1x16
29h-7Fh	Reserved
80h-FFh	Vendor specific

4.5 Extended Specification Compliance References

The Extended Specification Compliance Codes identify the electronic or optical interfaces which are not included in SFF-8472 Optical and Cable Variants Specification Compliance or SFF-8636 Specification Compliance Codes. A multi-lane pluggable module may support more than a single instantiation of the specified compliance code. Linear copper cables are identified by the code for the equivalent passive copper cable.

Table 4-4 Extended Specification Compliance Codes

Code	Description of Module Capability
00h	Unspecified
01h	100G AOC (Active Optical Cable), retimed or 25GAUI C2M AOC. Providing a worst BER of 5×10^{-5}
02h	100GBASE-SR4 or 25GBASE-SR
03h	100GBASE-LR4 or 25GBASE-LR
04h	100GBASE-ER4 or 25GBASE-ER
05h	100GBASE-SR10
06h	100G CWDM4
07h	100G PSM4 Parallel SMF
08h	100G ACC (Active Copper Cable), retimed or 25GAUI C2M ACC. Providing a worst BER of 5×10^{-5}
09h	Obsolete (assigned before 100G CWDM4 MSA required FEC)
0Ah	Reserved
0Bh	100GBASE-CR4, 25GBASE-CR CA-25G-L or 50GBASE-CR2 with RS (Clause91) FEC
0Ch	25GBASE-CR CA-25G-S or 50GBASE-CR2 with BASE-R (Clause 74 Fire code) FEC
0Dh	25GBASE-CR CA-25G-N or 50GBASE-CR2 with no FEC
0Eh	10 Mb/s Single Pair Ethernet (802.3cg, Clause 146/147, 1000 m copper)
0Fh	Reserved
10h	40GBASE-ER4
11h	4 x 10GBASE-SR
12h	40G PSM4 Parallel SMF
13h	G959.1 profile P1I1-2D1 (10709 MBd, 2 km, 1310 nm SM)
14h	G959.1 profile P1S1-2D2 (10709 MBd, 40 km, 1550 nm SM)
15h	G959.1 profile P1L1-2D2 (10709 MBd, 80 km, 1550 nm SM)
16h	10GBASE-T with SFI electrical interface
17h	100G CLR4
18h	100G AOC, retimed or 25GAUI C2M AOC. Providing a worst BER of 10^{-12} or below
19h	100G ACC, retimed or 25GAUI C2M ACC. Providing a worst BER of 10^{-12} or below
1Ah	100GE-DWDM2 (DWDM transceiver using 2 wavelengths on a 1550 nm DWDM grid with a reach up to 80 km)
1Bh	100G 1550nm WDM (4 wavelengths)
1Ch	10GBASE-T Short Reach (30 meters)
1Dh	5GBASE-T
1Eh	2.5GBASE-T
1Fh	40G SWDM4
20h	100G SWDM4
21h	100G PAM4 BiDi

Code	Description of Module Capability
37h	10GBASE-BR (Clause 158)[2]
38h	25GBASE-BR (Clause 159)[2]
39h	50GBASE-BR (Clause 160)[2]
22h	4WDM-10 MSA (10km version of 100G CWDM4 with same RS(528,514) FEC in host system)
23h	4WDM-20 MSA (20km version of 100GBASE-LR4 with RS(528,514) FEC in host system)
24h	4WDM-40 MSA (40km reach with APD receiver and RS(528,514) FEC in host system)
25h	100GBASE-DR (Clause 140), CAUI-4 (no FEC)
26h	100G-FR or 100GBASE-FR1 (Clause 140), CAUI-4 (no FEC on host interface)
27h	100G-LR or 100GBASE-LR1 (Clause 140), CAUI-4 (no FEC on host interface)
28h	100GBASE-SR1 (802.3, Clause 167), CAUI-4 (no FEC on host interface)
3Ah	100GBASE-VR1 (802.3, Clause 167), CAUI-4 (no FEC on host interface)
29h	100GBASE-SR1, 200GBASE-SR2 or 400GBASE-SR4 (802.3, Clause 167)
36h	100GBASE-VR1, 200GBASE-VR2 or 400GBASE-VR4 (802.3, Clause 167)
2Ah	100GBASE-FR1 (802.3, Clause 140) or 400GBASE-DR4-2 (802.3df, Clause 124)
2Bh	100GBASE-LR1 (802.3, Clause 140)
2Ch	100G-LR1-20 MSA, CAUI-4 (no FEC on host interface)
2Dh	100G-ER1-30 MSA, CAUI-4 (no FEC on host interface)
2Eh	100G-ER1-40 MSA, CAUI-4 (no FEC on host interface)
2Fh	100G-LR1-20 MSA
34h	100G-ER1-30 MSA
35h	100G-ER1-40 MSA
30h	Active Copper Cable with 50GAUI, 100GAUI-2 or 200GAUI-4 C2M. Providing a worst BER of 10^{-6} or below
31h	Active Optical Cable with 50GAUI, 100GAUI-2 or 200GAUI-4 C2M. Providing a worst BER of 10^{-6} or below
32h	Active Copper Cable with 50GAUI, 100GAUI-2 or 200GAUI-4 C2M. Providing a worst BER of 2.6×10^{-4} for ACC, 10^{-5} for AUI, or below
33h	Active Optical Cable with 50GAUI, 100GAUI-2 or 200GAUI-4 C2M. Providing a worst BER of 2.6×10^{-4} for AOC, 10^{-5} for AUI, or below
3Bh – 3Eh	Reserved
3Fh	100GBASE-CR1, 200GBASE-CR2 or 400GBASE-CR4 (802.3ck, Clause 162)
40h	50GBASE-CR, 100GBASE-CR2, or 200GBASE-CR4
41h	50GBASE-SR, 100GBASE-SR2, or 200GBASE-SR4
42h	50GBASE-FR or 200GBASE-DR4
4Ah	50GBASE-ER (IEEE 802.3, Clause 139)
43h	200GBASE-FR4
44h	200G 1550 nm PSM4
45h	50GBASE-LR
46h	200GBASE-LR4
47h	400GBASE-DR4 (802.3, Clause 124), 400GAUI-4 C2M (Annex 120G)
48h	400GBASE-FR4 (802.3, Clause 151)

Code	Description of Module Capability
49h	400GBASE-LR4-6 (802.3, Clause 151)
4Bh	400G-LR4-10
4Ch	400GBASE-ZR (P802.3cw, Clause 156), obsolete
4Dh – 7Eh	Reserved
7Fh	256GFC-SW4 (FC-PI-7P)
80h	64GFC (FC-PI-7)[1]
81h	128GFC (FC-PI-8)[1]
82h - FFh	Reserved

1. Not to be used for single lane application devices based on SFF-8472. Fibre Channel speeds are advertised in register 10 and 62, A0h, see SFF-8472
2. BR code names need link length value and laser wavelength defined direction (upstream or downstream) to completely specify transceiver capabilities

4.6 Host Electrical and Media Interface IDs

The following tables provide codes for the various electrical interface and optical or other media interface specifications that may apply to pluggable modules. Separate codes for the electrical and media interfaces enable modules to identify the specific combination of electrical and media specifications that the module supports. Codes for all publicly available networking industry specifications should be included.

Note: The codes are not listed in numerical order

The tables are assigned a Group ID value (GID). To accommodate more than the available 256 codes in each table, an Interface Unique ID has been introduced in CMIS 5.4 and later. It consists of two parts – a 4-bit Interface Group ID (GID) and 8-bit Interface ID. The GID identifies a table with up to 256 Interface codes and the Interface ID is the code from this table. An Interface code BEh in each table with GID=0 is used as an overflow value, indicating that the codes following use the Interface Unique ID structure.

4.6.1 Host Electrical Interface IDs

Table 4-5 Host Electrical Interface IDs, GID=0

ID	ID (Hex)	Host Electrical Interface (Specification Reference)	Application Bit Rate, Gb/s[2]	Lane Count	Lane Signaling Rate, GBd[2]	Modula-tion	b/ UI
0	0	Undefined					
		Ethernet					
1	1	1000BASE-CX (Clause 39)	1.25	1	1.25	NRZ	1
2	2	XAUI (Clause 47)	12.50	4	3.125	NRZ	1
3	3	XFI (SFF INF-8071i)	9.95-11.18	1	9.95-11.18	NRZ	1
4	4	SFI (SFF-8431)	9.95-11.18	1	9.95-11.18	NRZ	1
5	5	25GAUI C2M (Annex 109B)	25.78	1	25.78125	NRZ	1
6	6	XLAUI C2M (Annex 83B)	41.25	4	10.3125	NRZ	1
7	7	XLPPI (Annex 86A)	41.25	4	10.3125	NRZ	1
8	8	LAUI-2 C2M (Annex 135C)	51.56	2	25.78125	NRZ	1
9	9	50GAUI-2 C2M (Annex 135E)	53.13	2	26.5625	NRZ	1
10	A	50GAUI-1 C2M (Annex 135G)	53.13	1	26.5625	PAM4	2
11	B	CAUI-4 C2M (Annex 83E)[1]	103.13	4	25.78125	NRZ	1
65	41	CAUI-4 C2M (Annex 83E) without FEC	103.13	4	25.78125	NRZ	1
66	42	CAUI-4 C2M (Annex 83E) with RS (528,514) FEC	103.13	4	25.78125	NRZ	1
12	C	100GAUI-4 C2M (Annex 135E)	106.25	4	26.5625	NRZ	1
13	D	100GAUI-2 C2M (Annex 135G)	106.25	2	26.5625	PAM4	2
75	4B	100GAUI-1-S C2M (Annex 120G)	106.25	1	53.125	PAM4	2
76	4C	100GAUI-1-L C2M (Annex 120G)	106.25	1	53.125	PAM4	2
14	E	200GAUI-8 C2M (Annex 120C)	212.50	8	26.5625	NRZ	1
15	F	200GAUI-4 C2M (Annex 120E)	212.50	4	26.5625	PAM4	2
77	4D	200GAUI-2-S C2M (Annex 120G)	212.50	2	53.125	PAM4	2
78	4E	200GAUI-2-L C2M (Annex 120G)	212.50	2	53.125	PAM4	2
128	80	200GAUI-1 C2M (Annex 176D~~E~~)	212.50	1	106.25	PAM4	2
16	10	400GAUI-16 C2M (Annex 120C)	425.00	16	26.5625	NRZ	1
17	11	400GAUI-8 C2M (Annex 120E)	425.00	8	26.5625	PAM4	2

ID	ID (Hex)	Host Electrical Interface (Specification Reference)	Application Bit Rate, Gb/s[2]	Lane Count	Lane Signaling Rate, GBd[2]	Modula-tion	b/ UI
79	4F	400GAUI-4-S C2M (Annex 120G)	425.00	4	53.125	PAM4	2
80	50	400GAUI-4-L C2M (Annex 120G)	425.00	4	53.125	PAM4	2
129	81	400GAUI-2 C2M (Annex 176D~~E~~)	425.00	2	106.25	PAM4	2
81	51	800GAUI-8 S C2M (Annex 120G)	850.00	8	53.125	PAM4	2
82	52	800GAUI-8 L C2M (Annex 120G)	850.00	8	53.125	PAM4	2
130	82	800GAUI-4 C2M (~~Annex176E~~Annex 176D)	850.00	4	106.25	PAM4	2
85	55	1.6TAUI-16-S C2M (Annex 120G)	1700.00	16	53.125	PAM4	2
86	56	1.6TAUI-16-L C2M (Annex 120G)	1700.00	16	53.125	PAM4	2
131	83	1.6TAUI-8 C2M (~~Annex176E~~Annex 176D)	1700.00	8	106.25	PAM4	2
19	13	10GBASE-CX4 (Clause 54)	12.50	4	3.125	NRZ	1
20	14	25GBASE-CR CA-25G-L (Clause 110)	25.78	1	25.78125	NRZ	1
21	15	25GBASE-CR or 25GBASE-CR-S CA-25G-S (Clause 110)	25.78	1	25.78125	NRZ	1
22	16	25GBASE-CR or 25GBASE-CR-S CA-25G-N (Clause 110)	25.78	1	25.78125	NRZ	1
23	17	40GBASE-CR4 (Clause 85)	41.25	4	10.3125	NRZ	1
67	43	50GBASE-CR2 (Ethernet Technology Consortium) with RS (528,514) (Clause 91) FEC	51.56	2	25.78125	NRZ	1
68	44	50GBASE-CR2 (Ethernet Technology Consortium) with BASE-R (Clause 74), Fire code FEC	51.56	2	25.78125	NRZ	1
69	45	50GBASE-CR2 (Ethernet Technology Consortium) with no FEC	51.56	2	25.78125	NRZ	1
24	18	50GBASE-CR (Clause 136)	53.13	1	26.5625	PAM4	2
25	19	100GBASE-CR10 (Clause 85)	103.13	10	10.3125	NRZ	1
26	1A	100GBASE-CR4 (Clause 92)	103.13	4	25.78125	NRZ	1
27	1B	100GBASE-CR2 (Clause 136)	106.25	2	26.5625	PAM4	2
70	46	100GBASE-CR1 (Clause 162)	106.25	1	53.125	PAM4	2
28	1C	200GBASE-CR4 (Clause 136)	212.50	4	26.5625	PAM4	2
71	47	200GBASE-CR2 (Clause 162)	212.50	2	53.125	PAM4	2
29	1D	400G CR8 (Ethernet Technology Consortium)	425.00	8	26.5625	PAM4	2
72	48	400GBASE-CR4 (Clause 162)	425.00	4	53.125	PAM4	2
73	49	800G-ETC-CR8 or 800GBASE-CR8	850.00	8	53.125	PAM4	2
30	1E	200GBASE-CR1 (Clause179)	212.50	1	106.25	PAM4	2
31	1F	400GBASE-CR2 (Clause179)	425.00	2	106.25	PAM4	2
87	57	800GBASE-CR4 (Clause179)	850.00	4	106.25	PAM4	2
88	58	1.6TBASE-CR8 (Clause179)	1700.00	8	106.25	PAM4	2
32	20	LEI-100G-PAM4-1 (LPO MSA)	106.25	1	53.125	PAM4	2
33	21	LEI-200G-PAM4-2 (LPO MSA)	212.50	2	53.125	PAM4	2
34	22	LEI-400G-PAM4-4 (LPO MSA)	425.00	4	53.125	PAM4	2
35	23	LEI-800G-PAM4-8 (LPO MSA)	850.00	8	53.125	PAM4	2

ID	ID (Hex)	Host Electrical Interface (Specification Reference)	Application Bit Rate, Gb/s[2]	Lane Count	Lane Signaling Rate, GBd[2]	Modula-tion	b/ UI
18, 132-143	12, 84-8F	Reserved for Ethernet active modules					
		Fibre Channel					
37	25	8GFC (FC-PI-4)	8.50	1	8.500	NRZ	1
38	26	10GFC (10GFC)	10.52	1	10.51875	NRZ	1
39	27	16GFC (FC-PI-5)	14.03	1	14.025	NRZ	1
40	28	32GFC (FC-PI-6)	28.05	1	28.050	NRZ	1
41	29	64GFC (FC-PI-7)	57.80	1	28.900	PAM4	2
74	4A	128GFC (FC-PI-8)	112.20	1	56.100	PAM4	2
42	2A	128GFC (FC-PI-6P)	112.20	4	28.050	NRZ	1
43	2B	256GFC (FC-PI-7P)	231.20	4	28.900	PAM4	2
96-103	60-67	Reserved for future Fibre Channel codes					
		InfiniBand					
44	2C	IB SDR (Arch.Spec.Vol.2)	2.5 - 30	1, 2, 4, 8, 12	2.5	NRZ	1
45	2D	IB DDR (Arch.Spec.Vol.2)	5.0 - 60	1, 2, 4, 8, 12	5.0	NRZ	1
46	2E	IB QDR (Arch.Spec.Vol.2)	10 - 120	1, 2, 4, 8, 12	10.0	NRZ	1
47	2F	IB FDR (Arch.Spec.Vol.2)	14.06 – 168.75	1, 2, 4, 8, 12	14.0625	NRZ	1
48	30	IB EDR (Arch.Spec.Vol.2)	25.78 – 309.38	1, 2, 4, 8, 12	25.78125	NRZ	1
49	31	IB HDR (Arch.Spec.Vol.2)	53.13 – 637.5	1, 2, 4, 8, 12	26.5625	PAM4	2
50	32	IB NDR (Arch.Spec.Vol.2)	106.25 – 1275	1, 2, 4, 8, 12	53.125	PAM4	2
160	A0	IB XDR (placeholder)			106.25	PAM4	2
161-167	A1-A7	Reserved for future InfiniBand codes					
		CPRI					
51	33	E.96 (CPRI Specification V7.0)	9.83	1	9.8304	NRZ	1
52	34	E.99 (CPRI Specification V7.0)	10.14	1	10.1376	NRZ	1
53	35	E.119 (CPRI Specification V7.0)	12.17	1	12.16512	NRZ	1
54	36	E.238 (CPRI Specification V7.0)	24.33	1	24.33024	NRZ	1
		OTN(ITU-T)					
55	37	OTL3.4 (ITU-T G.709/Y.1331 G.Sup58) See XLAUI (overclocked)	43	4	10.7546	NRZ	1
56	38	OTL4.10 (ITU-T G.709/Y.1331 G.Sup58) See CAUI-10 (overclocked)	112	10	11.1810	NRZ	1
83	53	OTL4.2	112	2	27.9525	PAM4	2
57	39	OTL4.4 (ITU-T G.709/Y.1331 G.Sup58) See CEI-28G-VSR	112	4	27.9525	NRZ	1

ID	ID (Hex)	Host Electrical Interface (Specification Reference)	Application Bit Rate, Gb/s[2]	Lane Count	Lane Signaling Rate, GBd[2]	Modula-tion	b/ UI
58	3A	OTLC.4 (ITU-T G.709.1/Y.1331 G.Sup58) See CEI-28G-VSR	112	4	28.0762	NRZ	1
59	3B	FOIC1.4-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-28G-VSR	112	4	27.9524	NRZ	1
60	3C	FOIC1.2-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-56G-VSR-PAM4	112	2	27.9524	PAM4	2
61	3D	FOIC2.8-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-28G-VSR	224	8	27.9523	NRZ	1
62	3E	FOIC2.4-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-56G-VSR-PAM4	224	4	27.9523	PAM4	2
63	3F	FOIC4.16-MFI (ITU-T G.709.5/Y1331 G.Sup58) See CEI-28G-VSR	447	16	27.9523	NRZ	1
64	40	FOIC4.8-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-56G-VSR-PAM4	447	8	27.9523	PAM4	2
176	B0	FOIC1.1-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-112G-VSR-PAM4	112	1	55.9047	PAM4	2
179	B3	FOIC1e.1-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-112G-VSR-PAM4	106.5	1	53.25	PAM4	2
181	B5	FOIC1o.1-MFI. (ITU-T G709.mfi)	106.6875	1	53.34375	PAM4	2
177	B1	FOIC4.4-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-112G-VSR-PAM4	447	4	55.9047	PAM4	2
180	B4	FOIC4e.4-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-112G-VSR-PAM4	426	4	53.25	PAM4	2
182	B6	FOIC4o.4-MFI (ITU-T G709.mfi)	426.75	4	53.34375	PAM4	2
178	B2	FOIC8.8-MFI (ITU-T G.709.5/Y.1331 G.Sup58) See CEI-112G-VSR-PAM4	894	8	55.9047	PAM4	2
		PON					
183	B7	ITU-T G.9804.3	50	1	49.7664	NRZ	1
		PCIe					
112	70	PCIe 4.0	2.46-252.06	1,2,4,8, 16	16	NRZ	1
113	71	PCIe 5.0	2.46-504.12	1,2,4,8, 16	32	NRZ	1
114	72	PCIe 6.0	2.46-1024	1,2,4,8, 16	32	PAM4	2
115	73	PCIe 7.0 (placeholder)	2.46-2048	1,2,4,8, 16	64	PAM4	2
		OIF					
116	74	CEI-112G-LINEAR-PAM4	72n to 112n	1 to n	36 to 56	PAM4	2

ID	ID (Hex)	Host Electrical Interface (Specification Reference)	Application Bit Rate, Gb/s[2]	Lane Count	Lane Signaling Rate, GBd[2]	Modula-tion	b/ UI
144	90	EEI-100G-RTLR-1-S	106.25	1	53.125	PAM4	2
145	91	EEI-100G-RTLR-1-L	106.25	1	53.125	PAM4	2
146	92	EEI-200G-RTLR-2-S	212.5	2	53.125	PAM4	2
147	93	EEI-200G-RTLR-2-L	212.5	2	53.125	PAM4	2
148	94	EEI-400G-RTLR-4-S	425	4	53.125	PAM4	2
149	95	EEI-400G-RTLR-4-L	425	4	53.125	PAM4	2
150	96	EEI-800G-RTLR-8-S	850	8	53.125	PAM4	2
151	97	EEI-800G-RTLR-8-L	850	8	53.125	PAM4	2
152	98	EEI-200G-RTLR-1	212.5	1	106.25	PAM4	2
153	99	EEI-400G-RTLR-2	425	2	106.25	PAM4	2
154	9A	EEI-800G-RTLR-4	850	4	106.25	PAM4	2
155	9B	EEI-1.6T-RTLR-8	1700	8	106.25	PAM4	2
36,84, 89-95, 104-111, 117-127, ~~152~~156-159, 168-175~~82~~, ~~184~~184-189~~90~~, 191	24,54 59-5F 68-6F 75-7F ~~98~~9C-9F A8-~~B6~~AF B8-~~BE~~BD, BF	Reserved					
190~~1~~	~~BF~~BE	Reserved for an escape to overflow area	This code is used to indicate the Host Interface ID is defined in Host Electrical Interface ID tables with GID≠0. Refer to the Normalized Application Descriptor Structure on page 1Ch in CMIS on the use of the 12-bit Unique ID (UID).				
192-254	C0-FE	Vendor Specific/Custom					
255	FF	End of list					

Notes:
1. Not recommended for new designs. Codes 65 and/or 66 should be used.
2. In some instances, in this table values for Application Data Rate and Lane Signaling Rate have been rounded off. Please refer to the listed standards for exact values.

4.6.2 Media Interface IDs

Table 4-6 MMF media interface IDs, GID=0

ID	ID (Hex)	MM Media Interface (Specification Reference)	Application Bit Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modula-tion	b/UI
0	0	Undefined					
		Ethernet					
1	1	10GBASE-SW (Clause 52)	9.95	1	9.95328	NRZ	1
2	2	10GBASE-SR (Clause 52)	10.31	1	10.3125	NRZ	1
3	3	25GBASE-SR (Clause 112)	25.78	1	25.78125	NRZ	1
4	4	40GBASE-SR4 (Clause 86)	41.25	4	10.3125	NRZ	1
5	5	40GE SWDM4 MSA Spec	41.25	4	10.3125	NRZ	1
6	6	40GE BiDi	41.25	2	20.625	NRZ	1
7	7	50GBASE-SR (Clause 138)	53.13	1	26.5625	PAM4	2
8	8	100GBASE-SR10 (Clause 86)	103.13	10	10.3125	NRZ	1
9	9	100GBASE-SR4 (Clause 95)	103.13	4	25.78125	NRZ	1
10	A	100GE SWDM4 MSA Spec	103.13	4	25.78125	NRZ	1
11	B	100GE BiDi	106.25	2	25.5625	PAM4	2
12	C	100GBASE-SR2 (Clause 138)	106.25	2	26.5625	PAM4	2
13	D	100GBASE-SR1 (Clause 167)	106.25	1	53.125	PAM4	2
29	1D	100GBASE-VR1 (Clause 167)	106.25	1	53.125	PAM4	2
14	E	200GBASE-SR4 (Clause 138)	212.50	4	26.5625	PAM4	2
27	1B	200GBASE-SR2 (Clause 167)	212.50	2	53.125	PAM4	2
30	1E	200GBASE-VR2 (Clause 167)	212.50	2	53.125	PAM4	2
15	F	400GBASE-SR16 (Clause 123)	425.00	16	26.5625	NRZ	1
16	10	400GBASE-SR8 (Clause 138)	425.00	8	26.5625	PAM4	2
17	11	400GBASE-SR4 (Clause 167)	425.00	4	53.125	PAM4	2
31	1F	400GBASE-VR4 (Clause 167)	425.00	4	53.125	PAM4	2
18	12	800GBASE-SR8 (Clause 167)	850.00	8	53.125	PAM4	2
32	20	800GBASE-VR8 (Clause 167)	850.00	8	53.125	PAM4	2
26	1A	400GBASE-SR4.2 (Clause 150) (400GE BiDi)	425.00	8	26.5625	PAM4	2
33	21	800G-VR4.2	850.00	8	53.125	PAM4	2
34	22	800G-SR4.2	850.00	8	53.125	PAM4	2
35	23	1.6T-VR8.2	1700.00	16	53.125	PAM4	2
36	24	1.6T-SR8.2	1700.00	16	53.125	PAM4	2
		Fibre Channel					
19	13	8GFC-MM (FC-PI-4)	8.50	1	8.500	NRZ	1
20	14	10GFC-MM (10GFC)	10.52	1	10.51875	NRZ	1
21	15	16GFC-MM (FC-PI-5)	14.03	1	14.025	NRZ	1
22	16	32GFC-MM (FC-PI-6)	28.05	1	28.050	NRZ	1
23	17	64GFC-MM (FC-PI-7)	57.80	1	28.900	PAM4	2
28	1C	128GFC-MM (FC-PI-8)	112.20	1	56.100	PAM4	2
24	18	128GFC-MM4 (FC-PI-6P)	112.20	4	28.050	NRZ	1
25	19	256GFC-MM4 (FC-PI-7P)	231.20	4	28.900	PAM4	2

ID	ID (Hex)	MM Media Interface (Specification Reference)	Application Bit Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modula-tion	b/UI
37-~~19~~189, 191~~1~~	25-BD, BF~~F~~	Reserved					
190	BE	Reserved for an escape to overflow area	This code is used to indicate the MM Interface ID is defined in MMF Media Interface ID tables with GID≠0. Refer to the Normalized Application Descriptor Structure on page 1Ch in CMIS on the use of the 12-bit Unique ID (UID).				
192-255	C0-FF	Vendor Specific/Custom					

Table 4-7 SMF media interface IDs, GID=0

ID	ID (Hex)	SM Media Interface (Specification Reference)	Application Bit Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modula-tion	b/UI
0	0	Undefined					
		Ethernet					
1	1	10GBASE-LW (Clause 52)	9.95	1	9.95328	NRZ	1
2	2	10GBASE-EW (Clause 52)	9.95	1	9.953	NRZ	1
3	3	10G-ZW	9.95	1	9.953	NRZ	1
4	4	10GBASE-LR (Clause 52)	10.31	1	10.3125	NRZ	1
5	5	10GBASE-ER (Clause 52)	10.31	1	10.3125	NRZ	1
78	4E	10GBASE-BR (Clause 158)[1]	10.31	1	10.3125	NRZ	1
6	6	10G-ZR	10.31	1	10.3125	NRZ	1
7	7	25GBASE-LR (Clause 114)	25.78	1	25.78125	NRZ	1
8	8	25GBASE-ER (Clause 114)	25.78	1	25.78125	NRZ	1
79	4F	25GBASE-BR (Clause 159)[1]	25.78	1	25.78125	NRZ	1
9	9	40GBASE-LR4 (Clause 87)	41.25	4	10.3125	NRZ	1
10	A	40GBASE-FR (Clause 89)	41.25	1	41.25	NRZ	1
11	B	50GBASE-FR (Clause 139)	53.13	1	26.5625	PAM4	2
12	C	50GBASE-LR (Clause 139)	53.13	1	26.5625	PAM4	2
64	40	50GBASE-ER (Clause 139)	53.13	1	26.5625	PAM4	2
80	50	50GBASE-BR (Clause 160)[1]	53.13	1	26.5625	PAM4	2
13	D	100GBASE-LR4 (Clause 88)	103.13	4	25.78125	NRZ	1
14	E	100GBASE-ER4 (Clause 88)	103.13	4	25.78125	NRZ	1
15	F	100G PSM4 MSA Spec	103.13	4	25.78125	NRZ	1
52	34	100G CWDM4-OCP	103.13	4	25.78125	NRZ	1
16	10	100G CWDM4 MSA Spec	103.13	4	25.78125	NRZ	1
17	11	100G 4WDM-10 MSA Spec	103.13	4	25.78125	NRZ	1
18	12	100G 4WDM-20 MSA Spec	103.13	4	25.78125	NRZ	1
19	13	100G 4WDM-40 MSA Spec	103.13	4	25.78125	NRZ	1
20	14	100GBASE-DR (Clause 140)	106.25	1	53.125	PAM4	2
21	15	100G-FR MSA spec[2]/100GBASE-FR1 (Clause 140)	106.25	1	53.125	PAM4	2
22	16	100G-LR MSA spec[2]/100GBASE-LR1 (Clause 140)	106.25	1	53.125	PAM4	2
74	4A	100G-LR1-20 MSA Spec[2]	106.25	1	53.125	PAM4	2
75	4B	100G-ER1-30 MSA Spec[2]	106.25	1	53.125	PAM4	2
76	4C	100G-ER1-40 MSA Spec[2]	106.25	1	53.125	PAM4	2
68	44	100GBASE-ZR (Clause 154)	111.81	1	27.9525	DP-QPSK	4
23	17	200GBASE-DR4 (Clause 121)	212.50	4	26.5625	PAM4	2
24	18	200GBASE-FR4 (Clause 122)	212.50	4	26.5625	PAM4	2
25	19	200GBASE-LR4 (Clause 122)	212.50	4	26.5625	PAM4	2
65	41	200GBASE-ER4 (Clause 122)	212.50	4	26.5625	PAM4	2
115	73	200GBASE-DR1 (Clause 180)	212.50	1	106.25	PAM4	2
116	74	200GBASE-DR1-2 (Clause 181)	212.50	1	113.4375	PAM4	2
26	1A	400GBASE-FR8 (Clause 122)	425.00	8	26.5625	PAM4	2

ID	ID (Hex)	SM Media Interface (Specification Reference)	Application Bit Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modula-tion	b/UI
27	1B	400GBASE-LR8 (Clause 122)	425.00	8	26.5625	PAM4	2
66	42	400GBASE-ER8 (Clause 122)	425.00	8	26.5625	PAM4	2
28	1C	400GBASE-DR4 (Clause 124)	425.00	4	53.125	PAM4	2
85	55	400GBASE-DR4-2 (Clause 124)	425.00	4	53.125	PAM4	2
117	75	400GBASE-DR2 (Clause 180)	425.00	2	106.25	PAM4	2
118	76	400GBASE-DR2-2 (Clause 181)	425.00	2	113.4375	PAM4	2
29	1D	400G-FR4 MSA spec[2]/400GBASE-FR4 (Clause 151)	425.00	4	53.125	PAM4	2
67	43	400GBASE-LR4-6 (Clause 151)	425.00	4	53.125	PAM4	2
30	1E	400G-LR4-10 MSA Spec[2]	425.00	4	53.125	PAM4	2
111	6F	400G-ER4-30 MSA Spec[2]	425.00	4	53.125	PAM4	2
77	4D	400GBASE-ZR (Clause 156)	478.75	1	59.84375	DP-16QAM	8
86	56	800GBASE-DR8 (Clause 124)	850.00	8	53.125	PAM4	2
87	57	800GBASE-DR8-2 (Clause 124)	850.00	8	53.125	PAM4	2
119	77	800GBASE-DR4 (Clause 180)	850.00	4	106.25	PAM4	2
120	78	800GBASE-DR4-2 (Clause 181)	850.00	4	113.4375	PAM4	2
121	79	800GBASE-FR4-500 (Clause 183)	850.00	4	106.25	PAM4	2
122	7A	800GBASE-FR4 (Clause 183)	850.00	4	113.4375	PAM4	2
123	7B	800GBASE-LR4 (Clause 183)	850.00	4	113.4375	PAM4	2
124	7C	800GBASE-LR1 (Clause 185)	850.00	1	123.6364	DP-16QAM	8
125	7D	800GBASE-ER1-20 (Clause 187)	850.00	1	118.2	DP-16QAM	8
126	7E	800GBASE-ER1 (Clause 187)	850.00	1	118.2	DP-16QAM	8
127	7F	1.6TBASE-DR8 (Clause 180)	1700.00	8	106.25	PAM4	2
128	80	1.6TBASE-DR8-2 (Clause ~~181~~182)	1700.00	8	113.4375	PAM4	2
		Fibre Channel					
31	1F	8GFC-SM (FC-PI-4)	8.50	1	8.500	NRZ	1
32	20	10GFC-SM (10GFC)	10.52	1	10.51875	NRZ	1
33	21	16GFC-SM (FC-PI-5)	14.03	1	14.025	NRZ	1
34	22	32GFC-SM (FC-PI-6)	28.05	1	28.050	NRZ	1
35	23	64GFC-SM (FC-PI-7)	57.80	1	28.900	PAM4	2
69	45	128GFC-SM (FC-PI-8)	112.20	1	56.100	PAM4	2
36	24	128GFC-PSM4 (FC-PI-6P)	112.20	4	28.050	NRZ	1
38	26	128GFC-CWDM4 (FC-PI-6P)	112.20	4	28.050	NRZ	1
37, 39-43	25, 27-2B	Reserved					
		CPRI					
56	38	10G-SR	9.8304	1	9.8304	NRZ	1
57	39	10G-LR	9.8304	1	9.8304	NRZ	1
58	3A	25G-SR	24.33024	1	24.33024	NRZ	1
59	3B	25G-LR	24.33024	1	24.33024	NRZ	1
60	3C	10G-LR-BiDi	9.8304	1	9.8304	NRZ	1
61	3D	25G-LR-BiDi	24.33024	1	24.33024	NRZ	1

ID	ID (Hex)	SM Media Interface (Specification Reference)	Application Bit Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modula-tion	b/UI
		OTN (ITU-T)					
44	2C	4I1-9D1F (G.959.1)	112	4	28	NRZ	1
45	2D	4L1-9C1F (G.959.1)	112	4	28	NRZ	1
46	2E	4L1-9D1F (G.959.1)	112	4	28	NRZ	1
47	2F	C4S1-9D1F (G.695)	112	4	28	NRZ	1
48	30	C4S1-4D1F (G.695)	224	4	27.9523	PAM4	2
49	31	4I1-4D1F (G.959.1)	224	4	27.9523	PAM4	2
50	32	8R1-4D1F (G.959.1)	447	8	27.9523	PAM4	2
51	33	8I1-4D1F (G.959.1)	447	8	27.9523	PAM4	2
112	70	1I1-5D1F (G.959.1)	111.809474	1	55.90474	PAM4	2
113	71	1R1-5D1F (G.959.1)	111.809474	1	55.90474	PAM4	2
114	72	FOIC1.1-RS (G.709.1/Y.1331.58)[3]	126.278935	1	126.28		1
81	51	FOIC1.4-DO (G.709.3/Y.1331.3)[3]	126.278935	1	31.5697	DP-QPSK	4
82	52	FOIC2.8-DO (G.709.3/Y.1331.3)[3]	252.557871	1	31.5697	DP-16QAM	8
83	53	FOIC4.8-DO (G.709.3/Y.1331.3)[3]	505.115743	1	63.1395	DP-16QAM	8
84	54	FOIC2.4-DO (G.709.3/Y.1331.3)[3]	252.557871	1	63.1395	DP-QPSK	4
		OIF					
62	3E	400ZR (0x01, 0x03), DWDM, amplified	478.75	1	59.84375	DP-16QAM	8
63	3F	400ZR (0x02), Single Wavelength, Unamplified	478.75	1	59.84375	DP-16QAM	8
108	6C	800ZR-A (0x01), 150 GHz DWDM, Tx Output Range A	945.626,804, 824	1	118.203,350, 603	DP-16QAM	8
109	6D	800ZR-B (0x02), 150 GHz DWDM, Tx Output Range B	945.626,804, 824	1	118.203,350, 603	DP-16QAM	8
110	6E	800ZR-C (0x03), 150 GHz DWDM, Tx Output Range C	945.626,804, 824	1	118.203,350, 603	DP-16QAM	8
		OpenZR+					
70	46	ZR400-OFEC-16QAM	481.108374	1	60.1385468	DP-16QAM	8
53	35	ZR400-OFEC-16QAM-HA	481.108374	1	60.1385468	DP-16QAM	8
54	36	ZR400-OFEC-16QAM-HB	481.108374	1	60.1385468	DP-16QAM	8
55	37	ZR400-OFEC-8QAM-HA	481.108374	1	80.1847291	DP-8QAM	6
88	58	ZR400-OFEC-8QAM-HB	481.108374	1	80.1847291	DP-8QAM	6
71	47	ZR300-OFEC-8QAM	360.831281	1	60.1385468	DP-8QAM	6
89	59	ZR300-OFEC-8QAM-HA	360.831281	1	60.1385468	DP-8QAM	6
90	5A	ZR300-OFEC-8QAM-HB	360.831281	1	60.1385468	DP-8QAM	6
72	48	ZR200-OFEC-QPSK	240.554187	1	60.1385468	DP-QPSK	4
91	5B	ZR200-OFEC-QPSK-HA	240.554187	1	60.1385468	DP-QPSK	4
92	5C	ZR200-OFEC-QPSK-HB	240.554187	1	60.1385468	DP-QPSK	4
73	49	ZR100-OFEC-QPSK	120.277094	1	30.069273	DP-QPSK	4
93	5D	ZR100-OFEC-QPSK-HA	120.277094	1	30.069273	DP-QPSK	4
94	5E	ZR100-OFEC-QPSK-HB	120.277094	1	30.069273	DP-QPSK	4
		Open ROADM					
95	5F	FLEXO-4-DO-16QAM/FOIC4.8-DO	505.115743	1	63.1394679	DP-16QAM	8

ID	ID (Hex)	SM Media Interface (Specification Reference)	Application Bit Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modula-tion	b/UI
96	60	FLEXO-3-DO-8QAM/FOIC3.6-DO	378.836807	1	63.1394679	DP-8QAM	6
97	61	FLEXO-2-DO-QPSK/FOIC2.4-DO	252.557871	1	63.1394679	DP-QPSK	4
98	62	FLEXO-2-DO-16QAM/FOIC2.8-DO	252.557871	1	31.569734	DP-16QAM	8
99	63	FLEXO-1-DO-QPSK/FOIC1.4-DO	126.278935	1	31.569734	DP-QPSK	4
100	64	FLEXO-4e-DO-QPSK/FOIC4e.4-DO	472.813402412	1	118.203350603	DP-QPSK	4
101	65	FLEXO-4-DO-QPSK/FOIC4.4-DO	496.406851256	1	124.101712814	DP-QPSK	4
102	66	FLEXO-8e-DO-16QAM/FOIC8e.8-DO	945.626804824	1	118.203350603	DP-16QAM	8
103	67	FLEXO-8-DO-16QAM/FOIC8.8-DO	992.813702512	1	124.101712814	DP-16QAM	8
104	68	FLEXO-8e-DPO-16QAM/FOIC8e.8-DPO	1050.696449808	1	131.337056226	PCS[4]	3.125[5]
105	69	FLEXO-8-DPO-16QAM/FOIC8.8-DPO	1050.788225280	1	131.348528160	PCS[4]	3.281[5]
106	6A	FLEXO-6e-DPO-16QAM/FOIC6e.8-DPO	949.994596072	1	118.749324509	PCS[4]	2.594[5]
107	6B	FLEXO-6-DP0-16QAM/FOIC6.8-DPO	997.399447096	1	124.674930887	PCS[4]	2.594[5]
		Open XR Optics[6]					
129	81	XR400-16QAM	484.023917	16	3.7814369	DP-16QAM	8
130	82	XR300-8QAM	363.017938	16	3.7814369	DP-8QAM	6
131	83	XR200-QPSK	242.011959	16	3.7814369	DP-QPSK	4
132	84	XR200-16QAM	242.011959	8	3.7814369	DP-16QAM	8
133	85	XR100-QPSK	121.005979	8	3.7814369	DP-QPSK	4
134	86	XR100-16QAM	121.005979	4	3.7814369	DP-16QAM	8
		Open XR Optics Wide-Spacing[7]					
135	87	XR400-WS-16QAM	484.023917	16	3.7814369	DP-16QAM	8
136	88	XR200-WS-QPSK	242.011959	16	3.7814369	DP-QPSK	4
137	89	XR200-WS-16QAM	242.011959	8	3.7814369	DP-16QAM	8
138	8A	XR100-WS-QPSK	121.005979	8	3.7814369	DP-QPSK	4
139	8B	XR100-WS-16QAM	121.005979	4	3.7814369	DP-16QAM	8
140	8C	XR200-WS-BIDI-16QAM	242.011959	8	3.7814369	DP-16QAM	8
141	8D	XR100-WS-BIDI-QPSK	121.005979	8	3.7814369	DP-QPSK	4
142	8E	XR100-WS-BIDI-16QAM	121.005979	4	3.7814369	DP-16QAM	8
		LPO					
143	8F	100G-DR1-LPO	106.25	1	53.125	PAM4	2
144	90	200G-DR2-LPO	212.50	2	53.125	PAM4	2
145	91	400G-DR4-LPO	425.00	4	53.125	PAM4	2
147	93	400G-FR4-LPO	425.00	4	53.125	PAM4	2
146	92	800G-DR8-LPO	850.00	8	53.125	PAM4	2
14~~87~~-~~19~~189	9~~43~~-BD,	Reserved					

ID	ID (Hex)	SM Media Interface (Specification Reference)	Application Bit Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modula-tion	b/UI
, 191~~1~~	BF~~F~~						
190	BE	Reserved for an escape to overflow area	This code is used to indicate the SM Interface ID is defined in SMF Media Interface ID tables with GID≠0. Refer to the Normalized Application Descriptor Structure on page 1Ch in CMIS on the use of the 12-bit Unique ID (UID).				
192-255	C0-FF	Vendor Specific/Custom					

1. BR code names need link length value and laser wavelength defined direction (upstream or downstream) to completely specify transceiver capabilities.
2. 100G Lambda MSA.
3. Optical specifications for these codes are being developed in few standards organizations. Refer to vendor specification for more information on compliance. Transceivers that claim compliance to Open ROADM optical specification should use codes 5Fh, 61h, 62h and 63h.
4. Probabilistic Constellation Shaping.
5. b/sym/polarization.
6. Open XR Optics Codes for point-to-point dual fiber application.
7. Open XR Optics Codes for point-to-multipoint and/or bidirectional (BiDi) applications. These codes designate wider spacing between subcarriers. For BiDi applications, two distinct subcarriers are allocated for each Lane, one subcarrier in each direction.

Table 4-8 Passive and Linear Active Copper Cable and Passive Loopback media interface codes

ID	Code (Hex)	Application Name
0	0	Undefined
1	1	Copper cable
2-190	2-BE	Reserved
191	BF	Passive Loopback module
192	C0	Linear active copper loopback module
193-255	C1-FF	Vendor Specific/Custom

Note: Details for the cable assembly interface are defined using the host electrical interface codes in Table 4-5.

Table 4-9 Limiting and Retimed Active Cable assembly and Active Loopback media interface codes

ID	Code (Hex)	Application Name
0	0	Undefined
1	1	Active Cable assembly with BER < 10^{-12}
2	2	Active Cable assembly with BER < $5x10^{-5}$
3	3	Active Cable assembly with BER < $2.6x10^{-4}$
4	4	Active Cable assembly with BER < 10^{-6}
5-190	5-BE	Reserved
191	BF	Active Loopback module
192-255	C0-FF	Vendor Specific/Custom

Note: Details for the cable assembly interface are defined using the host electrical interface codes in Table 4-5.

Table 4-10 BASE-T media interface codes

ID	Code (Hex)	Application Name	Application Bit Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modula-tion	b/UI
0	0	Undefined					
		Ethernet Applications					
1	1	1000BASE-T (Clause 40)	1.12	4	0.125	PAM5	2.236068
2	2	2.5GBASE-T (Clause 126)	2.50	4	0.200	PAM16	3.125
3	3	5GBASE-T (Clause 126)	5.00	4	0.400	PAM16	3.125
4	4	10GBASE-T (Clause 55)	10.00	4	0.800	PAM16	3.125
5	5	25GBASE-T (Clause 113)	25	4	2.000	PAM16	3.125
6	6	40GBASE-T (Clause 113)	40	4	3.200	PAM16	3.125
7	7	50GBASE-T (Placeholder)					
8-191	8-BF	Reserved					
192-255	C0-FF	Custom					

4.7 Additional Transceiver Identifier Codes

Table 4-11 Transceiver Subtype codes

Code (hex)	QSFP+	QSFP-DD	SFP-DD	OSFP OSFP-RHS	OSFP-XD OSFP-XD-RHS
0	Unknown or Unspecified				
1	Type 1	Type 1	Type 1	Type 1	Type 1
2	Type 2	Type 2	Type 2	Type 2	Type 2
3	Type 2A	Type 2A	Reserved	Type 3	Reserved
4	Type 2B	Type 2B	Reserved	Reserved	Reserved
5	Reserved	Type 2C	Reserved	Reserved	Reserved
6-F	Reserved	Reserved	Reserved	Reserved	Reserved

Table 4-12 Fiber Face Type Codes

Code (hex)[1]	Fiber face types
0	Unknown or unspecified
1	PC/UPC (Physical/Ultra Physical contact)
2	APC (Angled Physical Contact)
3	Reserved
Note 1: If there is more than one optical connector, as is the case with OIF-ELSFP, this code refers to the connector on the front face of the module	

Table 4-13 Heatsink Type Codes

Code (hex)	Heatsink type
0	Unknown or unspecified
1	RHS – Riding Heatsink
2	IHS – Integrated Heatsink, Open Top
3	IHS – Integrated Heatsink, Closed Top
4-F	Reserved

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