



SFF-8024

Specification for

SFF Module Management Reference Code Tables

Rev 4.6.2 ~~November 4~~ February 14, 2019

SECRETARIAT: SFF TA TWG

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

ABSTRACT:

This draft specification provides codes for module identifiers, encoding values, connector types, extended compliance codes, host electrical interfaces and module media interfaces.

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

POINTS OF CONTACT:

~~Tom Palkert~~ Vera Koleva _____ Chairman SFF TA TWG
~~Molex, LLC, II-VI Incorporated~~
E-mail: _SFF-Chair@snia.org
~~2222 Wellington Court~~ 1389 Moffett Park Dr.
~~Lisle, IL 60532~~ Sunnyvale, CA 94089
~~tom.palkert@molex.com~~ vera.koleva@finisar.com

1 **Intellectual Property**

2 The user's attention is called to the possibility that implementation of this specification may require the use of an
3 invention covered by patent rights. By distribution of this specification, no position is taken with respect to the
4 validity of a claim or claims or of any patent rights in connection therewith.

5 This specification is considered SNIA Architecture and is covered by the SNIA IP Policy and as a result goes through
6 a request for disclosure when it is published. Additional information can be found at the following locations:

- 8 • Results of IP Disclosures: <http://www.snia.org/sffdisclosures>
- 9 • SNIA IP Policy: <http://www.snia.org/ippolicy>

11 **Copyright**

12 The SNIA hereby grants permission for individuals to use this document for personal use only, and for corporations
13 and other business entities to use this document for internal use only (including internal copying, distribution, and
14 display) provided that:

- 15 1. Any text, diagram, chart, table or definition reproduced shall be reproduced in its entirety with no
16 alteration, and,
- 17 2. Any document, printed or electronic, in which material from this document (or any portion hereof) is
18 reproduced shall acknowledge the SNIA copyright on that material, and shall credit the SNIA for granting
19 permission for its reuse.

20 Other than as explicitly provided above, there may be no commercial use of this document, or sale of any part, or
21 this entire document, or distribution of this document to third parties. All rights not explicitly granted are expressly
22 reserved to SNIA.

23 Permission to use this document for purposes other than those enumerated (Exception) above may be requested
24 by e-mailing copyright_request@snia.org. Please include the identity of the requesting individual and/or company
25 and a brief description of the purpose, nature, and scope of the requested use. Permission for the Exception shall
26 not be unreasonably withheld. It can be assumed permission is granted if the Exception request is not acknowledged
27 within ten (10) business days of SNIA's receipt. Any denial of permission for the Exception shall include an
28 explanation of such refusal.

29 **Disclaimer**

30 The information contained in this publication is subject to change without notice. The SNIA makes no warranty of
31 any kind with regard to this specification, including, but not limited to, the implied warranties of merchantability
32 and fitness for a particular purpose. The SNIA shall not be liable for errors contained herein or for incidental or
33 consequential damages in connection with the furnishing, performance, or use of this specification.

34 Suggestions for revisions should be directed to <http://www.snia.org/feedback/>.

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 <http://www.snia.org/sff/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 master table for Identifier Values as per Transceiver SSWG
 - Added master 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 master table for Specification Compliance Codes
 - Added master 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
- Rev 2.9
 - Added 16h 10GBASE-T with SFI electrical interface to Extended Specification Compliance 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
 - Changed 1Ah acronym to 100GE-DWDM2 and added description
- Rev 4.0
 - 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
 - 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
 - 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
 - *March 8, 2019*
 - 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 2.4×10^{-6} to 2.6×10^{-6} in Table 4-9
 - Added code for active cable with BER $< 10^{-6}$ in Table 4-9

Rev 4.6.2 *November 4, 2019*

- [Changed editor's name and contact information](#)
- [Added missing abbreviation descriptions](#)
- [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](#)
- [Added new codes 0Bh/0Ch/0Dh for 50GBASE-CR2 variants in Table 4-4](#)
- [Changed the names of codes 26h and 27h to 100GBASE-FR1 and 100GBASE-LR1 respectively 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](#)
- [Changed the titles for Tables 4-8 and 4-9 to include passive and active loopbacks and added new codes BFh for loopback modules](#)

Formatted Table

1
2
3

DRAFT

1 Contents

2	1. Scope	8
3	2. References, Conventions, Keywords, Definitions	8
4	 2.1 Industry Documents	8
5	 2.2 Sources	11
6	 2.3 Conventions	12
7	 2.4 Keywords, Acronyms, and Definitions	14
8	 2.4.1 Keywords	14
9	 2.4.2 Acronyms and Abbreviations	14
10	 2.4.3 Definitions	15
11	3. General Description	17
12	 3.1 Configuration Overview/Descriptions	17
13	4. Transceiver or Cable Management	18
14	 4.1 Overview	18
15	 4.2 Transceiver References	20
16	 4.3 Encoding References	21
17	 4.4 Connector References	22
18	 4.5 Extended Specification Compliance References	22
19	 4.6 Host Electrical and Media Interface Codes	28
20	1. Scope	7
21	2. References, Conventions, Keywords, Definitions	7
22	 2.1 Industry Documents	7
23	 2.2 Sources	8
24	 2.3 Conventions	9
25	 2.4 Keywords, Acronyms, and Definitions	10
26	 2.4.1 Keywords	10
27	 2.4.2 Acronyms and Abbreviations	10
28	 2.4.3 Definitions	11
29	3. General Description	12
30	 3.1 Configuration Overview/Descriptions	12
31	4. Transceiver or Cable Management	13
32	 4.1 Overview	13
33	 4.2 Transceiver References	14
34	 4.3 Encoding References	15
35	 4.4 Connector References	16
36	 4.5 Extended Specification Compliance References	16
37	 4.6 Host Electrical and Media Interface Codes	19

38
39
40

Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font
Formatted: Default Paragraph Font

1 **Figures**

2 Figure 2-1 Plug and Receptacle Definition 16

3

4

5 **Tables**

6 ~~Table 2-1 Sources for Industry Standards and Specifications 11~~

7 ~~Table 3-1 Module form factors and management interface specifications 17~~

8 ~~Table 4-1 Identifier Values 20~~

9 ~~Table 4-2 Encoding Values 21~~

10 ~~Table 4-3 Connector Types 22~~

11 ~~Table 4-4 Extended Specification Compliance Codes 23~~

12 ~~Table 4-5 Host Electrical Interface Codes 28~~

13 ~~Table 4-6 850 nm MM media interface codes 31~~

14 ~~Table 4-7 SM media interface codes 35~~

15 ~~Table 4-8 Passive Copper Cable and Passive Loopback media interface codes 40~~

16 ~~Table 4-9 Active Cable assembly and Active Loopback media interface codes 40~~

17 ~~Table 4-10 BASE-T media interface codes 41~~

18 ~~Table 3-1 Module form factors and management interface specifications 12~~

19 ~~Table 4-1 Identifier Values 14~~

20 ~~Table 4-2 Encoding Values 15~~

21 ~~Table 4-3 Connector Types 16~~

22 ~~Table 4-4 Extended Specification Compliance Codes 17~~

23 ~~Table 4-5 Host Electrical Interface Codes 20~~

24 ~~Table 4-6 850 nm MM media interface codes 23~~

25 ~~Table 4-7 SM media interface codes 24~~

26 ~~Table 4-8 Passive Copper Cable interface codes 25~~

27 ~~Table 4-9 Active Cable assembly media interface codes 26~~

28 ~~Table 4-10 BASE-T media interface advertising codes 26~~

29

30

- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font
- Formatted: Default Paragraph Font

1. Scope

This draft specification defines the SFF Module Management Reference Codes. This draft 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](#)
- [40G SWDM4 MSA Technical Specifications](#)
- [Abridged Common Management Interface Specification \(ACMIS\)](#)
- [CLR4 - Replaced in the market by CWDM4 Technical Specification](#)
- [Common Management Interface Specification \(CMIS\)](#)
- [CPRI V7.0](#)
- [DSFP Module Specification](#)
- [IEEE Std 802.3](#)
- [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-4.5.6.6p.7](#)
- [INF-8077 XFP 1X 10 Gb/s Pluggable Module](#)
- [INF-8438 QSFP 4X 4 Gb/s Transceiver \(Quad SFP\)](#)
- [InfiniBand Architecture Specification Volume 2](#)
- [ITU-T G.709/Y.1331](#)
- [ITU-T G.Sup58](#)
- [microQSFP Specification](#)
- [QSFP-DD Hardware Specification for QSFP Double Density 8X Pluggable Transceiver](#)
- [REF-TA-1011 Cross Reference to Select SFF Connectors and Modules](#)
- [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](#)

Formatted Table

- ~~- 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~~
- ~~- Specification for OSFP~~
- ~~- InfiniBand Architecture Specification Volume 2~~
- ~~- CPRI V7.0~~
- ~~- ITU-T G.709/Y.1331~~
- ~~- IEEE Std 802.3~~
- ~~- ITU-T G.Sup58~~
- ~~- INCITS FC-PH 4.5,6,6p,7~~
- ~~- 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)~~
- ~~- SFF-8071 SFP+ 1X 0.8mm Card Edge Connector~~
- ~~- INF-8077 XFP 1X 10 Gb/s Pluggable Module~~
- ~~- 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+ Caged Cage~~
- ~~- SFF-8436 QSFP+ 4X 10 Gb/s Pluggable Transceiver~~
- ~~- INF-8438 QSFP 4X 4 Gb/s Transceiver (Quad SFP)~~
- ~~- 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~~

- 1 ~~SFF-8635~~ ~~QSFP+~~ ~~4X 10 Gb/s Pluggable Transceiver Solution (QSFP10)~~
- 2 ~~SFF-8636~~ ~~Management Interface for Cabled Environments~~
- 3 ~~SFF-8639~~ ~~Multifunction 6X Unshielded Connector~~
- 4 ~~SFF-8640~~ ~~Serial Attachment 4X 24 Gb/s Unshielded Connector~~
- 5 ~~SFF-8642~~ ~~Mini Multilane 12X 10 Gb/s Shielded Connector (CXP10)~~
- 6 ~~SFF-8643~~ ~~Mini Multilane 4/8X 12 Gb/s Unshielded Connector (HD12un)~~
- 7 ~~SFF-8644~~ ~~Mini Multilane 4/8X 12 Gb/s Shielded Cage/Connector (HD12sh)~~
- 8 ~~SFF-8647~~ ~~Mini Multilane 12X 14 Gb/s Shielded Cage/Connector (CXP14)~~
- 9 ~~SFF-8648~~ ~~Mini Multilane 12X 28 Gb/s Shielded Cage/Connector (CXP28)~~
- 10 ~~SFF-8661~~ ~~QSFP+~~ ~~4X Pluggable Module~~
- 11 ~~SFF-8662~~ ~~QSFP+~~ ~~4X Connector (Style A)~~
- 12 ~~SFF-8663~~ ~~QSFP+~~ ~~Cage (Style A)~~
- 13 ~~SFF-8665~~ ~~QSFP+~~ ~~4X 28 Gb/s Pluggable Transceiver Solution (QSFP28)~~
- 14 ~~SFF-8672~~ ~~QSFP+~~ ~~4X Connector (Style B)~~
- 15 ~~SFF-8678~~ ~~Serial Attachment 2X 6 Gb/s Unshielded Connector~~
- 16 ~~SFF-8679~~ ~~QSFP+~~ ~~4X Base Electrical Specification~~
- 17 ~~SFF-8680~~ ~~Serial Attachment 2X 12 Gb/s Unshielded Connector~~
- 18 ~~SFF-8681~~ ~~Serial Attachment 2X 24 Gb/s Unshielded Connector~~
- 19 ~~SFF-8682~~ ~~QSFP+~~ ~~4X Connector~~
- 20 ~~SFF-8683~~ ~~QSFP+~~ ~~Cage~~
- 21 ~~SFF-8685~~ ~~QSFP+~~ ~~4X 14 Gb/s Pluggable Transceiver Solution (QSFP14)~~
- 22 ~~REF TA-1011~~ ~~Cross-Reference to Select SFF Connectors and Modules~~
- 23
- 24
- 25 ~~QSFP-DD~~ ~~www.qsfp-dd.com~~
- 26 ~~SFP-DD~~ ~~www.sfp-dd.com~~
- 27 ~~QSFP~~ ~~www.osfpmsa.org~~
- 28 ~~DSFP~~ ~~www.dsfpmsa.org~~
- 29 ~~QSFP-DD~~ ~~Common Management Interface Specification (CMIS)~~
- 30 ~~DSFP~~ ~~Management Interface Specification (ACMIS)~~
- 31 ~~CLR4~~
- 32 ~~SWDM~~
- 33 ~~4WDM~~
- 34
- 35
- 36
- 37
- 38
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56

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 <http://www.snia.org/sff/specifications>. Suggestions for improvement of this specification will be welcome, they should be submitted to <http://www.snia.org/feedback>.

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

Table 2-1 Sources for Industry Standards and Specifications

<u>Standards and Specifications</u>	<u>Organization</u>	<u>Website</u>
<u>100G CWDM and 100G 4WDM Specifications</u>	<u>CWDM4 MSA</u>	<u>www.cwdm4-msa.org</u>
<u>100G-FR, 100G-LR and 400G-FR4 Specifications</u>	<u>100G Lambda MSA</u>	<u>http://100glambda.com/</u>
<u>40G and 100G SWDM4 Specifications</u>	<u>SWDM Alliance</u>	<u>www.SWDM.org</u>
<u>DSFP and ACMIS Specifications</u>	<u>DSFP MSA</u>	<u>http://dsfpmsa.org/</u>
<u>Electronic Industry Alliance (EIA)</u>	<u>Electronic Components Industry Association (ECIA)</u>	<u>https://www.ecianow.org</u>
<u>IEEE 802 standards</u>	<u>Institute of Electrical and Electronics Engineers (IEEE)</u>	<u>https://ieeexplore.ieee.org/browse/standards/get-program/page/series?id=68 or https://www.ieee.org</u>
<u>INCITS</u>	<u>International Committee for Information Technology Standards</u>	<u>http://www.techstreet.com/incitsgate.tmpl</u>
<u>InfiniBand</u>	<u>InfiniBand Trade Association (IBTA)</u>	<u>https://www.infinibandta.org</u>
<u>microQSFP Specification</u>	<u>microQSFP MSA</u>	<u>http://www.microqsfp.com/</u>
<u>OIF Implementation Agreements</u>	<u>Optical Internetworking Forum</u>	<u>https://www.oiforum.com</u>
<u>QSFP Specification</u>	<u>QSFP MSA</u>	<u>www.osfpmsa.org</u>
<u>PCIe</u>	<u>PCI-SIG</u>	<u>http://pcisig.com</u>
<u>QSFP-DD and CMIS Specifications</u>	<u>QSFP-DD MSA</u>	<u>http://www.qsfp-dd.com/</u>
<u>SAS</u>	<u>International Committee for Information Technology Standards (INCITS)</u>	<u>http://www.incits.org</u>
<u>SFP-DD and SFP-DD Management Specifications</u>	<u>SFP-DD MSA</u>	<u>www.sfp-dd.com</u>
<u>100G CWDM and 100G 4WDM Specifications</u>	<u>CWDM4 MSA</u>	<u>www.cwdm4-msa.org</u>

Formatted Table

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45

~~Copies of INCITS standards may be obtained from the InterNational Committee for Information Technology Standards (<http://www.techstreet.com/incitsgate.html>).~~

~~Copies of PCIe standards may be obtained from the PCI-SIG (<http://pcisig.com>).~~

~~Copies of InfiniBand standards may be obtained from the InfiniBand Trade Association (IBTA) (<http://www.infinibandta.org>).~~

~~Copies of IEEE standards may be obtained from the Institute of Electrical and Electronics Engineers (IEEE) (<https://www.ieee.org>).~~

~~Copies of SAS standards may be obtained from the International Committee for Information Technology Standards (INCITS) (<http://www.incits.org>).~~

~~Copies of OIF Implementation Agreements may be obtained from the Optical Internetworking Forum (<http://www.oiforum.com>).~~

~~Copies of Electronic Industries Alliance (EIA) standards may be obtained from the Electronic Components Industry Association (ECIA) (<https://www.ecianow.org>).~~

~~Copies of SFP-DD specifications may be obtained from the SFP-DD MSA group (<https://www.sfp-dd-msa.org>).~~

~~Copies of QSFP-DD specifications may be obtained from the QSFP-DD MSA group (<https://www.qsfp-dd.com>).~~

~~Copies of CMIS (Common Management Interface Specification) may be obtained from the QSFP-DD MSA group (<https://www.qsfp-dd.com>).~~

~~Copies of DSFP specification may be obtained from the DSFP MSA group (<https://www.dsfpmsa.org>).~~

~~Copies of the microQSFP specification may be obtained from the microQSFP MSA group (<https://www.microqsfpmsa.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.

1
2
3
4
5

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
1,000	1 000	1 000
1,323,462.9	1 323 462,9	1 323 462.9

6
7

DRAFT

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.

Optional: A keyword that describes features which are not required by the SFF specification. However, if any feature defined by the SFF specification is implemented, it shall be done in the same way as defined by the specification. Describing a feature as optional in the text is done to assist the reader.

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

~~DAC: Direct Attach Copper (passive)~~

ACC: Active Copper Cable

DSFP: Dual Small Form Factor Pluggable

DWDM: Dense Wavelength Division Multiplexing

GBIC: Giga Bit Interface Converter

HSSDC: High Speed Serial Data Connector

1 LC: _____ Lucent Connector
2
3 MPO: _____ Multi-fiber Push-On connector
4 MT-RJ: _____ [Mechanical transfer registered jack connector](#)
5 MU: _____ [Miniature unit connector](#)
6 MXC: _____ Multi-media eXtension Connector
7 OSFP: _____ Octal Small Form Factor Pluggable
8 PAM4: _____ Pulse Amplitude Modulation 4 levels
9 PSM4: _____ Parallel Single Mode 4 lane
10 QSFP: _____ Quad Small Form Factor Pluggable
11 QSFP-DD: _____ Quad Small Form Factor Pluggable Double Density
12 RJ45: _____ [Registered jack 45 connector](#)
13 SC: _____ [Standard connector](#)
14 SFI: _____ SFP+ high speed electrical interface
15 SFP: _____ Small Form Factor Pluggable
16 SFP-DD: _____ Small Form Factor Pluggable Double Density
17 SG: _____ [Second generation connector](#)
18 SWDM: _____ [Shortwave wavelength division multiplexed](#)
19 TNC: _____ Threaded Neill-Concelman
20
21 X2: _____ 10G form factor pluggable
22 XAUI: _____ 10 lane Attachment Unit Interface
23 XENPAK: _____ 10Gbit Ethernet transceiver Package
24 XFF: _____ [\(Obsolete\)](#)
25 XFF-E: _____ [\(Obsolete\)](#)
26 XFI: _____ XFP high speed electrical Interface
27 XFP: _____ 10G Form factor Pluggable
28 XPAK: _____ 10G form factor pluggable
29
30
31
32
33
34
35
36
37
38
39
40

2.4.3 Definitions

42 **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.

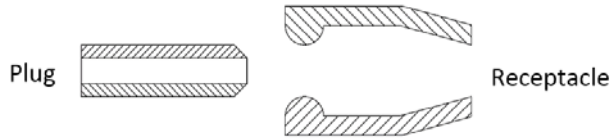
47 **Module:** In this specification, module refers to:

48 1) an assembly that is terminated with a plug (See [Figure 2-1](#)~~Figure 2-4~~) [at the end of a cable assembly \(active or](#)
49 [passive copper\)](#) ~~or an active optical cable (AOC) intended to mate to a receptacle at the end of a direct attach~~
50 ~~copper (DAC), an active copper cable (ACC) or an active optical cable (AOC) intended to mate to a receptacle.~~

51 or

52 2) an optical transceiver typically inserted into a front panel socket that connects to the electrical interface of the
53 system with a plug (See [Figure 2-1](#)~~Figure 2-4~~) and the optical interface of the outside world.

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



4
5 **Figure 2-1 Plug and Receptacle Definition**

6
7 **Receptacle:** A term used to describe the connector that contains the contacts that accept the plug contacts as
8 shown in [Figure 2-1](#)~~Figure 2-1~~. Receptacles typically contain spring contacts. Other common terms include female
9 and socket connector.

3. General Description

3.1 Configuration Overview/Descriptions

This draft 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 <u>and later</u>	SFF-8472
QSFP+	SFF-8436
QSFP+/ <u>QSFP28 and later</u>	SFF-8636
<u>QSFP28</u>	<u>SFF-8636</u>
QSFP-DD	CMIS
QSFP	CMIS
<u>SFP-DD</u>	<u>SFP-DD Management interface specification</u>
<u>MicroQSFP</u>	<u>SFF-8436</u>

Formatted: Not Highlight

Formatted: Not Highlight

Formatted Table

4. Transceiver or Cable Management

4.1 Overview

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

The information will only be 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)~~, ~~connector type (Table 4-3)~~ connector type (Table 4-3), ~~compliance code (Table 4-4)~~ compliance code (Table 4-4), ~~host electrical interface code (Table 4-5)~~ host electrical interface code (Table 4-5) or ~~compliance module media interface code (Tables 4-6 to 4-10)~~ compliance 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 ~~using 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. The registers for each table are:

- Table 4-1 Identifier Values
SFF-8472 A0h, Byte 0
SFF-8636 and CMIS Page 00h Byte 0 and Page 00h Byte 128
- Table 4-2 Encoding Values
SFF-8436, SFF-8636 00h Byte 139
SFF-8472 A0h Byte 11
- Table 4-3 Connector Types
SFF-8436, SFF-8636 Page 00h Byte 130
SFF-8472 A0h 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 A0h Byte 36
- Table 4-5 Host Electrical Interface Codes
CMIS lower page, bytes 86, 90, 94, 98, 102, 106, 110, and 114
- Table 4-6 to Table 4-10 Module-Media Interface Codes
CMIS lower page, bytes 87, 91, 95, 99, 103, 107, 111, and 115

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.

- Formatted: Font: Bold
- Field Code Changed
- Formatted: Font: Bold
- Formatted: Font: Bold
- Formatted: Font: Bold
- Field Code Changed
- Field Code Changed
- Formatted: Font: Bold
- Field Code Changed

- Formatted: Indent: First line: 0"
- Formatted: Indent: Left: 0.5", First line: 0.5"
- Formatted: Indent: First line: 0.5"

1
2~~Table 4-1 Identifier Values~~~~SFF-8472 A0h, Byte 0~~~~SFF-8636 and CMIS Page 00h Byte 0 and Page 00h Byte 128~~~~Table 4-2 Encoding Values~~~~SFF-8436, SFF-8636 and CMIS Page 00h Byte 139~~~~SFF-8472 A0h Byte 11~~~~Table 4-3 Connector Types~~~~SFF-8436, SFF-8636 and CMIS Page 00h Byte 130~~~~SFF-8472 A0h Byte 2~~~~Table 4-4 Extended Specification Compliance Codes~~~~SFF-8636 and CMIS Page 00h Byte 192~~~~SFF-8472 A0h Byte 36~~

~~4.2 Host Electrical and Media Interface Codes~~

~~The following tables provide codes for the various electrical interface and optical or 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 publically available networking industry specifications should be included.~~

~~Table 4-5 Host Electrical Interface Codes~~~~CMIS lower page, bytes 86, 90, 94, 98, 102, 106, 110, and 114~~~~Table 4-6 to Table 4-10 Module Media Interface Codes~~~~CMIS lower page, bytes 87, 91, 95, 99, 103, 107, 111, and 115~~

4.34.2 Transceiver References

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

Table 4-1 Identifier Values

Value	Description of Module
00h	Unknown or unspecified
01h	GBIC
02h	Module/connector soldered to motherboard (using SFF-8472)
03h	SFP/SFP+/SFP28 <u>and later</u>
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)
14h	Shielded Mini Multilane HD 4X Fanout Cable
15h	Shielded Mini Multilane HD 8X Fanout Cable
16h	CDFP (Style 3)
17h	microQSFP
18h	QSFP-DD Double Density 8X Pluggable Transceiver (INF-8628)
19h	QSFP 8X Pluggable Transceiver
1Ah	SFP-DD Double Density 2X Pluggable Transceiver
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	
20h	
1F2h-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

Formatted: Justified

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.

4.4.3 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.

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. I.e. for 200GAUI-4 use -code for PAM4.

1 **4.5.4 Connector References**

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

5 **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	Mini CS optical connector
27h	MPO 2x12
28h	MPO 1x16
29h-7Fh	Reserved
80h-FFh	Vendor specific

6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

4.5 Extended Specification Compliance References

4.6

Formatted: Normal

Formatted: Normal

Formatted: Indent: Left: 0", Hanging: 0.25", No bullets or numbering

Formatted: Normal

1 The Extended Specification Compliance Codes identify the electronic or optical interfaces which are not included in
 2 SFF-8472 Optical and Cable Variants Specification Compliance or SFF-8636 Specification Compliance Codes. A multi-
 3 ~~plane~~ pluggable module may support more than a single instantiation of the specified compliance code.
 4
 5

6 **Table 4-4 Extended Specification Compliance Codes**

Code	Description of Module Capability
00h	Unspecified
01h	100G AOC (Active Optical Cable) 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) 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-0Fh	Reserved
10h	40GBASE-ER4
11h	4 x 10GBASE-SR
12h	40G PSM4 Parallel SMF
13h	G959.1 profile P1I1-2D1 (10709 MBd, 2km, 1310 nm SM)
14h	G959.1 profile P1S1-2D2 (10709 MBd, 40km, 1550 nm SM)
15h	G959.1 profile P1L1-2D2 (10709 MBd, 80km, 1550 nm SM)
16h	10GBASE-T with SFI electrical interface
17h	100G CLR4
18h	100G AOC or 25GAUI C2M AOC. Providing a worst BER of 10^{-12} or below
19h	100G ACC 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

Formatted: Font: Bold
 Formatted: Keep lines together
 Formatted Table

<u>22h</u>	<u>4WDM-10 MSA (10km version of 100G CWDM4 with same RS(528,514) FEC in host system)</u>
<u>Code</u>	<u>Description of Module Capability</u>
<u>23h</u>	<u>4WDM-20 MSA (20km version of 100GBASE-LR4 with RS(528,514) FEC in host system)</u>
<u>24h</u>	<u>4WDM-40 MSA (40km reach with APD receiver and RS(528,514) FEC in host system)</u>
<u>25h</u>	<u>100GBASE-DR (clause 140), CAUI-4 (no FEC)</u>
<u>26h</u>	<u>100GBASE-FR1 (clause 140), CAUI-4 (no FEC)</u>
<u>27h</u>	<u>100GBASE-LR1 (clause 140), CAUI-4 (no FEC)</u>
<u>28h – 2Fh</u>	<u>Reserved</u>
<u>30h</u>	<u>Active Copper Cable with 50GAUI, 100GAUI-2 or 200GAUI-4 C2M. Providing a worst BER of 10^{-6} or below</u>
<u>31h</u>	<u>Active Optical Cable with 50GAUI, 100GAUI-2 or 200GAUI-4 C2M. Providing a worst BER of 10^{-6} or below</u>
<u>32h</u>	<u>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</u>
<u>33h</u>	<u>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</u>
<u>34h – 3Fh</u>	<u>Reserved</u>
<u>40h</u>	<u>50GBASE-CR, 100GBASE-CR2, or 200GBASE-CR4</u>
<u>41h</u>	<u>50GBASE-SR, 100GBASE-SR2, or 200GBASE-SR4</u>
<u>42h</u>	<u>50GBASE-FR or 200GBASE-DR4</u>
<u>43h</u>	<u>200GBASE-FR4</u>
<u>44h</u>	<u>200G 1550 nm PSM4</u>
<u>45h</u>	<u>50GBASE-LR</u>
<u>46h</u>	<u>200GBASE-LR4</u>
<u>47h – 4Fh</u>	<u>Reserved</u>
<u>50h</u>	<u>64GFC EA</u>
<u>51h</u>	<u>64GFC SW</u>
<u>52h</u>	<u>64GFC LW</u>
<u>53h</u>	<u>128GFC EA</u>
<u>54h</u>	<u>128GFC SW</u>
<u>55h</u>	<u>128GFC LW</u>
<u>56h - FFh</u>	<u>Reserved</u>

Formatted: Centered

~~Table 4-4 Extended Specification Compliance Codes~~

DRAFT

Code	Description of Module Capability
00h	Unspecified
01h	100G AOC (Active Optical Cable) 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) 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 or 25GBASE-CR-CA-25G-L
0Ch	25GBASE-CR-CA-25G-S
0Dh	25GBASE-CR-CA-25G-N
0Eh-0Fh	Reserved
10h	40GBASE-ER4
11h	4 x 10GBASE-SR
12h	40G PSM4 Parallel SMF
13h	G959.1 profile P1H1-2D1 (10709 MBd, 2km, 1310 nm SM)
14h	G959.1 profile P1S1-2D2 (10709 MBd, 40km, 1550 nm SM)
15h	G959.1 profile P1L1-2D2 (10709 MBd, 80km, 1550 nm SM)
16h	10GBASE-T with SFI electrical interface
17h	100G-CLR4
18h	100G AOC or 25GAUI C2M AOC. Providing a worst BER of 10^{-12} or below
19h	100G ACC 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
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-BR, with CAUI-4 without FEC
26h	100G-FR, with CAUI-4 without FEC
27h	100G-LR, with CAUI-4 without FEC
28h-2Fh	Reserved
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
34h-3Fh	Reserved

Formatted: Font: Not Bold
 Formatted: Caption, Left, Don't keep with next
 Formatted Table

Code	Description of Module Capability
40h	50GBASE-CR, 100GBASE-CR2, or 200GBASE-CR4
41h	50GBASE-SR, 100GBASE-SR2, or 200GBASE-SR4
42h	50GBASE-FR or 200GBASE-DR4
43h	200GBASE-FR4
44h	200G-1550-nm-PSM4
45h	50GBASE-LR
46h	200GBASE-LR4
47h-4Fh	Reserved
50h	64GFC-EA
51h	64GFC-SW
52h	64GFC-LW
53h	128GFC-EA
54h	128GFC-SW
55h	128GFC-LW
56h-FFh	Reserved

Formatted: Font: Not Bold
Formatted: Caption, Left, Don't keep with next
Formatted Table

1
2

DRAFT

4.7 4.6 Host Electrical and Media Interface Codes

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

Formatted: Indent: Left: 0", Hanging: 0.25", No bullets or numbering

Formatted: Font: Bold

Table 4-5 Host Electrical Interface Codes

ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
0	0	Undefined				-	
-		Ethernet	-	-	-	-	
1	1	1000BASE -CX (Clause 39)	1.25	1	1.25	NRZ	1
2	2	XAU1 (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	XLAU1 C2M (Annex 83B)	41.25	4	10.3125	NRZ	1
7	7	XLPP1 (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
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
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
18	12	Reserved				-	
19	13	10GBASE-CX4 (Clause 54)	12.50	4	3.125	NRZ	1
20	14	25GBASE-CR CA-L (Clause 110)	25.78	1	25.78125	NRZ	1
21	15	25GBASE-CR CA-S (Clause 110)	25.78	1	25.78125	NRZ	1
22	16	25GBASE-CR CA-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 with RS (Clause 91) FEC	51.56	2	25.78	NRZ	1
68	44	50GBASE-CR2 with BASE-R (Clause 74 Fire code) FEC	51.56	2	25.78	NRZ	1
69	45	50GBASE-CR2 with no FEC	51.56	2	25.78	NRZ	1
24	18	50GBASE-CR (Clause 126)	53.13	1	26.5625	PAM4	2

Formatted Table

Formatted Table

ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
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
28	1C	200GBASE-CR4 (Clause 136)	212.50	4	26.5625	PAM4	2
29	1D	400G CR8 ()	425.00	8	26.5625	PAM4	2
30	1E	100GBASE-T (Clause 40)	1.12	4	0.125	PAM5	2.236068
31	1F	2.5GBASE-T (Clause 126)	2.50	4	0.200	PAM16	3.125
32	20	5GBASE-T (Clause 126)	5.00	4	0.400	PAM16	3.125
33	21	10GBASE-T (Clause 55)	10.00	4	0.800	PAM16	3.125
34	22	25GBASE-T (Clause 113)	25	4	2.000	PAM16	3.125
35	23	40GBASE-T (Clause 113)	40	4	3.200	PAM16	3.125
36	24	50GBASE-T (Placeholder)				-	
-						-	
-		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
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
-						-	
-		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 - 169	1, 2, 4, 8, 12	14.0625	NRZ	1
48	30	IB EDR (Arch.Spec.Vol.2)	26 - 309	1, 2, 4, 8, 12	25.78125	NRZ	1
49	31	IB HDR (Arch.Spec.Vol.2)	52 - 618	1, 2, 4, 8, 12	26.5625	PAM4	2
50	32	IB NDR	Nx100G			-	
-						-	
-		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	-	-	-	-	

Formatted Table

<u>ID</u>	<u>Code (Hex)</u>	<u>Application Name</u>	<u>Application Data Rate, Gb/s</u>	<u>Lane Count</u>	<u>Lane Signaling Rate, GBd</u>	<u>Modulation</u>	<u>b/sym</u>
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
57	39	OTL4.4 (ITU-T G.709/Y.1331 G.Sup58) See CEI-28G-VSR	112	4	27.9525	NRZ	1
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 (ITU-T G.709.1/Y.1331 G.Sup58) See CEI-28G-VSR	112	4	27.9524	NRZ	1
60	3C	FOIC1.2 (ITU-T G.709.1/Y.1331 G.Sup58) See CEI-56G-VSR-PAM4	112	2	27.9524	PAM4	2
61	3D	FOIC2.8 (ITU-T G.709.1/Y.1331 G.Sup58) See CEI-28G-VSR	224	8	27.9523	NRZ	1
62	3E	FOIC2.4 (ITU-T G.709.1/Y.1331 G.Sup58) See CEI-56G-VSR-PAM4	224	4	27.9523	PAM4	2
63	3F	FOIC4.16 (ITU-T G.709.1 G.Sup58) See CEI-28G-VSR	447	16	27.9523	NRZ	1
64	40	FOIC4.8 (ITU-T G.709.1 G.Sup58) See CEI-56G-VSR-PAM4	447	8	27.9523	PAM4	2
70-191	46-BF	Reserved	-	-	-	-	
192-254	C0-FE	Vendor Specific/Custom	-	-	-	-	
255	FE	End of list					
<u>Notes:</u> 1. Not recommended for new designs. New codes 65 and/or 66 should be used							

Formatted Table

1
2
3
4
5
6
7
8
9

Formatted: Indent: Left: 0", First line: 0"

Formatted: Font: Bold

Table 4-5 Host Electrical Interface Codes Table 4-6 850 nm MM media interface codes

ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
0	0	Undefined				-	
-		Ethernet	-	-	-	-	
1	1	1000BASE-CX (Clause 39)	1.25	4	1.25	NRZ	1
2	2	XAU1 (Clause 47)	12.50	4	3.125	NRZ	1
3	3	XFI (SFF-1071)	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	XLAI-C2M (Annex 83B)	41.25	4	10.3125	NRZ	1
7	7	XLPI (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
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
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
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
18	12	Reserved				-	
19	13	10GBASE-CX4 (Clause 54)	12.50	4	3.125	NRZ	1
20	14	25GBASE-CR CA-L (Clause 110)	25.78	1	25.78125	NRZ	1
21	15	25GBASE-CR CA-S (Clause 110)	25.78	1	25.78125	NRZ	1
22	16	25GBASE-CR CA-N (Clause 110)	25.78	1	25.78125	NRZ	1
23	17	40GBASE-CR4 (Clause 85)	41.25	4	10.3125	NRZ	1
24	18	50GBASE-CR (Clause 126)	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
28	1C	200GBASE-CR4 (Clause 136)	212.50	4	26.5625	PAM4	2
29	1D	400G-CR8 ()	425.00	8	26.5625	PAM4	2
30	1E	1000BASE-T (Clause 40)	1.12	4	0.125	PAM5	2.236068
31	1F	2.5GBASE-T (Clause 126)	2.50	4	0.200	PAM16	3.125
32	20	5GBASE-T (Clause 126)	5.00	4	0.400	PAM16	3.125
33	21	10GBASE-T (Clause 55)	10.00	4	0.800	PAM16	3.125
34	22	25GBASE-T (Clause 113)	25	4	2.000	PAM16	3.125
35	23	40GBASE-T (Clause 113)	40	4	3.200	PAM16	3.125
36	24	50GBASE-T ()				-	
-						-	
-		Fibre Channel	-	-	-	-	

ID	Code- (Hex)	Application Name	Application- Data-Rate, Gb/s	Lane- Count	Lane- Signaling- Rate, GBd	Modul- ation	b/sym
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
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
-							
-		InfiniBand-	-	-	-	-	
44	2C	IB-SDR (Arch.Spec.Vol.2 R.1.3.1)	2.5-30	1, 2, 4, 8, 12	2.5	NRZ	1
45	2D	IB-DDR (Arch.Spec.Vol.2 R.1.3.1)	5.0-60	1, 2, 4, 8, 12	5.0	NRZ	1
46	2E	IB-QDR (Arch.Spec.Vol.2 R.1.3.1)	10-120	1, 2, 4, 8, 12	10.0	NRZ	1
47	2F	IB-FDR (Arch.Spec.Vol.2 R.1.3.1)	14-169	1, 2, 4, 8, 12	14.0625	NRZ	1
48	30	IB-EDR (Arch.Spec.Vol.2 R.1.3.1)	26-309	1, 2, 4, 8, 12	25.78125	NRZ	1
49	31	IB-HDR (Arch.Spec.Vol.2 R.1.3.1)	52-618	1, 2, 4, 8, 12	26.5625	PAM4	2
50	32	IB-NDR	Nx100G			-	
-							
-		GPRI-	-	-	-	-	
51	33	E-96 (GPRI Specification V7.0)	9.83	1	9.8304	NRZ	1
52	34	E-99 (GPRI Specification V7.0)	10.14	1	10.1376	NRZ	1
53	35	E-119 (GPRI Specification V7.0)	12.17	1	12.16512	NRZ	1
54	36	E-238 (GPRI Specification V7.0)	24.33	1	24.33024	NRZ	1
-							
-		OTN-	-	-	-	-	
55	37	OTL3.4 (ITU-T G.709/Y.1331- G.Supp58) See XLAUI (overclocked)	43	4	10.7546	NRZ	1
56	38	OTL4.10 (ITU-T G.709/Y.1331- G.Supp58) See CAUI-10 (overclocked)	112	10	11.1810	NRZ	1
57	39	OTL4.4 (ITU-T G.709/Y.1331- G.Supp58) See CEI-28G-VSR	112	4	27.9525	NRZ	1
58	3A	OTL4.4 (ITU-T G.709/Y.1331- G.Supp58) See CEI-28G-VSR	112	4	28.0762	NRZ	1
59	3B	FOIC1.4 (ITU-T G.709/Y.1331- G.Supp58) See CEI-28G-VSR	112	4	27.9524	NRZ	1
60	3C	FOIC1.2 (ITU-T G.709/Y.1331- G.Supp58) See CEI-56G-VSR-PAM4	112	2	27.9524	PAM4	2
61	3D	FOIC2.8 (ITU-T G.709/Y.1331- G.Supp58)	224	8	27.9523	NRZ	1
62	3E	FOIC2.8 (ITU-T G.709/Y.1331- G.Supp58)	224	4	27.9523	PAM4	2

ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
63	3F	FOIC2.8 (ITU-T G.709/Y.1331-G.Supp58)	447	16	27.9523	NRZ	1
64	40	FOIC2.8 (ITU-T G.709/Y.1331-G.Supp58)	447	8	27.9523	PAM4	2
65-194	41-BF	Reserved	-	-	-	-	
192-254	60-FE	Vendor Specific/Custom	-	-	-	-	
255	FF	End of list					

Notes:-

1. a proposal to change this code is under discussion

ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
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	100G-SR (Placeholder)				-	
14	E	200GBASE-SR4 (Clause 138)	212.50	4	26.5625	PAM4	2
15	F	400GBASE-SR16 (Clause 123)	425.00	16	26.5625	NRZ	1
16	10	400GBASE-SR8 (Clause 138)	425.00	16	26.5625	PAM4	2
17	11	400G-SR4 (Placeholder)				-	
18	12	800G-SR8 (Placeholder)				-	
26	1A	400GBASE-SR4.2 (Clause 150) (400GE BiDi)	425.00	8	26.5625	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

Formatted: List Paragraph, Numbered + Level: 1 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 0.25" + Indent at: 0.5"

Formatted Table

Formatted: Left

ID	Code- (Hex)	Application Name	Application- Data-Rate, Gb/s	Lane- Count	Lane- Signaling- Rate, GBd	Modul- ation	b/sym
<u>23</u>	<u>17</u>	<u>64GFC-MM (FC-PI-7)</u>	<u>57.80</u>	<u>1</u>	<u>28.900</u>	<u>PAM4</u>	<u>2</u>
<u>24</u>	<u>18</u>	<u>128GFC-MM4 (FC-PI-6P)</u>	<u>112.20</u>	<u>4</u>	<u>28.050</u>	<u>NRZ</u>	<u>1</u>
<u>25</u>	<u>19</u>	<u>256GFC-MM4 (FC-PI-7P)</u>	<u>231.20</u>	<u>4</u>	<u>28.900</u>	<u>PAM4</u>	<u>2</u>
<u>27- 191</u>	<u>1B-BF</u>	<u>Reserved</u>	-	-	-	-	
<u>- 192- 255</u>	<u>C0-FF</u>	<u>Vendor Specific/Custom</u>	-	-	-	-	

1
2

Table 4-7 Table 4-7 SM media interface codes Table 4-6 850 nm MM media interface codes

ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
0	0	Undefined				-	
-		Ethernet	-	-	-	-	
1	1	10GBASE-LW (CI 52)	9.95	1	9.95328	NRZ	1
2	2	10GBASE-EW (CI 52)	9.95	1	9.953	NRZ	1
3	3	10G-ZW	9.95	1	9.953	NRZ	1
4	4	10GBASE-LR (CI 52)	10.31	1	10.3125	NRZ	1
5	5	10GBASE-ER (CI 52)	10.31	1	10.3125	NRZ	1
6	6	10G-ZR	10.31	1	10.3125	NRZ	1
7	7	25GBASE-LR (CI 114)	25.78	1	25.78125	NRZ	1
8	8	25GBASE-ER (CI 114)	25.78	1	25.78125	NRZ	1
9	9	40GBASE-LR4 (CI 87)	41.25	4	10.3125	NRZ	1
10	A	40GBASE-FR (CI 89)	41.25	1	41.25	NRZ	1
11	B	50GBASE-FR (CI 139)	53.13	1	26.5625	PAM4	2
12	C	50GBASE-LR (CI 139)	53.13	1	26.5625	PAM4	2
64	40	50GBASE-ER (CI 139)	53.13	1	26.5625	PAM4	2
13	D	100GBASE-LR4 (CI 88)	103.13	4	25.78125	NRZ	1
14	E	100GBASE-ER4 (CI 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 (CI 140)	106.25	1	53.125	PAM4	2
21	15	100G-FR	106.25	1	53.125	PAM4	2
22	16	100G-LR	106.25	1	53.125	PAM4	2
23	17	200GBASE-DR4 (CI 121)	212.50	4	26.5625	PAM4	2
24	18	200GBASE-FR4 (CI 122)	212.50	4	26.5625	PAM4	2
25	19	200GBASE-LR4 (CI 122)	212.50	4	26.5625	PAM4	2
65	41	200GBASE-ER4 (CI 122)	212.50	4	26.5625	PAM4	2
26	1A	400GBASE-FR8 (CI 122)	425.00	8	26.5625	PAM4	2
27	1B	400GBASE-LR8 (CI 122)	425.00	8	26.5625	PAM4	2
66	42	400GBASE-ER8 (CI 122)	425.00	8	26.5625	PAM4	2
28	1C	400GBASE-DR4 (CI 124)	425.00	4	53.125	PAM4	2
29	1D	400G-FR4	425.00	4	53.125	PAM4	2
30	1E	400G-LR4	425.00	4	53.125	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

Formatted Table

Formatted Table

Formatted Table

Formatted Table

ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
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
36	24	128GFC-PSM4 (FC-PI-6P)	112.20	4	28.050	NRZ	1
37	25	256GFC-PSM4 (FC-PI-7P)	231.20	4	28.900	PAM4	2
38	26	128GFC-CWDM4 (FC-PI-6P)	112.20	4	28.050	NRZ	1
39	27	256GFC-CWDM4 (FC-PI-7P)	231.20	4	28.900	PAM4	2
40-43	28-2B	Reserved					
		OTN					
-			-	-	-	-	
44	2C	411-9D1F (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	411-4D1F (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
53-55	35-37	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
		OIF					
62	3E	400ZR, DWDM, amplified	425.00	1	59.84375	DP-16QAM	8
63	3F	400ZR, Single Wavelength, Unamplified	425.00	1	59.84375	DP-16QAM	8
67-191	43-BF	Reserved	-	-	-	-	
192-255	C0-FF	Vendor Specific/Custom	-	-	-	-	
ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
0	0	Undefined					
-		Ethernet					
4	4	10GBASE-SW (Clause 52)	9.95	4	9.95328	NRZ	4

Formatted Table

- Formatted: Font: Bold
- Formatted: Font: Not Bold
- Formatted: Left
- Formatted: Font: Not Bold
- Formatted: Font: Not Bold
- Formatted: Left
- Formatted: Font: Not Bold

2	2	10GBASE-SR (Clause 52)	10.31	4	10.3125	NRZ	4
3	3	25GBASE-SR (Clause 112)	25.78	4	25.78125	NRZ	4
4	4	40GBASE-SR4 (Clause 86)	41.25	4	10.3125	NRZ	4
5	5	40GE SWDM4 MSA Spec	41.25	4	10.3125	NRZ	4
6	6	40GE BiDi	41.25	2	20.625	NRZ	4
7	7	50GBASE-SR (Clause 138)	53.13	4	26.5625	PAM4	2
8	8	100GBASE-SR10 (Clause 86)	103.13	40	10.3125	NRZ	4
9	9	100GBASE-SR4 (Clause 95)	103.13	4	25.78125	NRZ	4
10	A	100GE SWDM4 MSA Spec	103.13	4	25.78125	NRZ	4
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	100G-SR				-	
14	E	200GBASE-SR4 (Clause 138)	212.50	4	26.5625	PAM4	2
15	F	400GBASE-SR16 (Clause 123)	425.00	16	26.5625	NRZ	4
16	10	400G-SR8				-	
17	11	400G-SR4				-	
18	12	800G-SR8				-	
26	1A	400GE BiDi	425.00	8	26.5625	-PAM4	2
-		Fibre Channel	-	-	-	-	
19	13	8GFC-MM (FC-P1-4)	8.50	4	8.500	NRZ	4
20	14	10GFC-MM (10GFC)	10.52	4	10.51875	NRZ	4
21	15	16GFC-MM (FC-P1-5)	14.03	4	14.025	NRZ	4
22	16	32GFC-MM (FC-P1-6)	28.05	4	28.050	NRZ	4
23	17	64GFC-MM (FC-P1-7)	57.80	4	28.900	PAM4	2
24	18	128GFC-MM4 (FC-P1-6P)	112.20	4	28.050	NRZ	4
25	19	256GFC-MM4 (FC-P1-7P)	231.20	4	28.900	PAM4	2
27- 191	1B-BF	Reserved	-	-	-	-	
-						-	
192- 255	60-FF	Vendor-Specific/Custom	-	-	-	-	

Table 4-7 SM media interface codes

ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
0	0	Undefined				-	
-		Ethernet	-	-	-	-	
1	1	10GBASE-LW (CI-52)	9.95	1	9.95328	NRZ	1
2	2	10GBASE-EW (CI-52)	9.95	1	9.953	NRZ	1
3	3	10G-ZW	9.95	1	9.953	NRZ	1
4	4	10GBASE-LR (CI-52)	10.31	1	10.3125	NRZ	1
5	5	10GBASE-ER (CI-52)	10.31	1	10.3125	NRZ	1
6	6	10G-ZR	10.31	1	10.3125	NRZ	1
7	7	25GBASE-LR (CI-114)	25.78	1	25.78125	NRZ	1
8	8	25GBASE-ER (CI-114)	25.78	1	25.78125	NRZ	1
9	9	40GBASE-LR4 (CI-87)	41.25	4	10.3125	NRZ	1
10	A	40GBASE-FR (CI-89)	41.25	1	41.25	NRZ	1
11	B	50GBASE-FR (CI-139)	53.13	1	26.5625	PAM4	2
12	C	50GBASE-LR (CI-139)	53.13	1	26.5625	PAM4	2
13	D	100GBASE-LR4 (CI-88)	103.13	4	25.78125	NRZ	1
14	E	100GBASE-ER4 (CI-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-OCF	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 (CI-140)	106.25	1	53.125	PAM4	2
21	15	100G-FR	106.25	1	53.125	-PAM4	2
22	16	100G-LR	106.25	1	53.125	-PAM4	2
23	17	200GBASE-DR4 (CI-121)	212.50	4	26.5625	PAM4	2
24	18	200GBASE-FR4 (CI-122)	212.50	4	26.5625	PAM4	2
25	19	200GBASE-LR4 (CI-122)	212.50	4	26.5625	PAM4	2
26	1A	400GBASE-FR8 (CI-122)	425.00	8	26.5625	PAM4	2
27	1B	400GBASE-LR8 (CI-122)	425.00	8	26.5625	PAM4	2
28	1C	400GBASE-DR4 (CI-124)	425.00	4	53.125	PAM4	2
29	1D	400G-FR4	425.00	4	53.125	PAM4	2
30	1E	400G-LR4	425.00	4	53.125	PAM4	2
-						-	
-		Fibre Channel	-	-	-	-	
31	1F	8GFC-SM (FC-P1-4)	8.50	1	8.500	NRZ	1
32	20	10GFC-SM (10GFC)	10.52	1	10.51875	NRZ	1
33	21	16GFC-SM (FC-P1-5)	14.03	1	14.025	NRZ	1
34	22	32GFC-SM (FC-P1-6)	28.05	1	28.050	NRZ	1
35	23	64GFC-SM (FC-P1-7)	57.80	1	28.900	PAM4	2
36	24	128GFC-PSM4 (FC-P1-6P)	112.20	4	28.050	NRZ	1

ID	Code- (Hex)	Application Name	Application- Data Rate, Gb/s	Lane- Count	Lane- Signaling- Rate, GBd	Modul- ation	b/sym
37	25	256GFC-PSM4 (FC-PI-7P)	231.20	4	28.900	PAM4	2
38	26	128GFC-CWDM4 (FC-PI-6P)	112.20	4	28.050	NRZ	1
39	27	256GFC-CWDM4 (FC-PI-7P)	231.20	4	28.900	PAM4	2
40-43	28-2B	Reserved					
-		OTN	-	-	-	-	
44	2C	4H1-9D1F	112	4	28	NRZ	1
45	2D	4L1-9C1F	112	4	28	NRZ	1
46	2E	4L1-9D1F	112	4	28	NRZ	1
47	2F	64S1-9D1F	112	4	28	NRZ	1
48	30	64S1-4D1F	224	4	27.9523	PAM4	2
49	31	4H1-4D1F	224	4	27.9523	PAM4	2
50	32	8R1-4D1F	447	8	27.9523	PAM4	2
51	33	8H1-4D1F	447	8	27.9523	PAM4	2
53-55	35-37	Reserved					
		GPRI					
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
62-191	3E-BF	Reserved	-	-	-	-	
192-255	60-FF	Vendor Specific/Custom	-	-	-	-	

1
2

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

ID	Code (Hex)	Application Name
0	0	Undefined
1	1	Copper cable
2-190+	2-BEF	Reserved
191	BE	Passive Loopback module
192-255	C0-FF	Vendor Specific/Custom

Formatted Table

Formatted: Highlight

Formatted: Left

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

Formatted: Font: 10 pt, Not Bold

~~4-8~~ Note: Details for the cable assembly interface are defined using the host electrical interface codes in Host Electrical and Media Interface Codes

Formatted: Font: Bold

Formatted: Normal

Formatted: Font: 10 pt

Formatted: Indent: Left: 0.25", No bullets or numbering

Formatted: Font: 10 pt, Not Bold

Formatted: Heading 2, Indent: Left: 0.25"

The following tables provide codes for the various electrical interface and optical or 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 publically available networking industry specifications should be included.

~~Table 4-5~~ Error! Reference source not found.

Formatted: Font: Not Bold

Table 4-9 ~~Table 4-9~~ 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-BEF	Reserved
191	BE	Active Loopback module
192-255	C0-FF	Vendor Specific/Custom

Formatted Table

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

Formatted: Indent: Left: 0", Hanging: 0.25"

~~4-9~~ Note: Details for the cable assembly interface are defined using the host electrical interface codes in Host Electrical and Media Interface Codes

Formatted: Font: 10 pt, Not Bold

Formatted: Highlight

The following tables provide codes for the various electrical interface and optical or 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

publically available networking industry specifications should be included.
Table 4-5.

Table 4-10 BASE-T media interface advertising codes

ID	Code (Hex)	Application Name	Application Data Rate, Gb/s	Lane Count	Lane Signaling Rate, GBd	Modulation	b/sym
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
-						-	
5-191	5-BF	Reserved					
192-255	C0-FF	Custom					

Formatted Table

Formatted: Centered

END OF DOCUMENT

Formatted: Font: Bold

Formatted: Centered