ISO/IEC TR 11801-9908

Edition 1.0 2020-05

TECHNICAL REPORT

colour inside

Information technology – Generic cabling for customer premises – Part 9908: Guidance for the support of higher speed applications over optical fibre channels

ISO/IEC TR 11801-9908:2020-05(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 35.200

ISBN 978-2-8322-8311-0

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FOREWORD

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ISO/IEC TR 11801-9908, which is a Technical Report, was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

The list of all currently available parts of the ISO/IEC 11801 series, under the general title *Information technology – Generic cabling for customer premises*, can be found on the IEC and ISO websites.

The text of this Technical Report is based on the following documents:

DTR	Report on voting
JTC1-SC25/2927/DTR	JTC1-SC25/2940/RVDTR

Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The need to support cost-efficient high-speed applications over optical fibre has resulted in the availability of a wide variety of applications and implementation options. The available options to support high-speed applications over optical fibre have multiplied in recent years, and the trend towards higher speeds can be expected to continue. Innovative techniques to maximize the useful life of installed infrastructure include the use of multi-level encoding schemes, wavelength division multiplexing, parallel fibre transmission, and new cabled optical fibre categories. In order to make informed decisions regarding the optimal infrastructure choices to support deployment of high-speed applications today, and enable the optimal migration path to higher speeds in the future, cabling system specifiers, designers and users need to have a good understanding of the duplex and parallel application options, and their connectivity choices.

This document describes the options for high-speed applications utilizing duplex and parallel optical fibre channels and identifies relevant migration considerations when upgrading or planning to upgrade to higher speed applications.

INFORMATION TECHNOLOGY – GENERIC CABLING FOR CUSTOMER PREMISES –

Part 9908: Guidance for the support of higher speed applications over optical fibre channels

1 Scope

This part of ISO/IEC 11801, which is a Technical Report,

- provides a listing of the data centre application options currently available or in process of standardization utilizing duplex and parallel optical fibre channels;
- identifies migration considerations when upgrading to higher speed applications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 11801-1, *Information technology – Generic cabling for customer premises – Part 1: General requirements*

ISO/IEC 14763-2, *Information technology – Implementation and operation of customer premises cabling – Part 2: Planning and installation*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 11801-1 and ISO/IEC 14763-2 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.2 Abbreviated terms

MPO Multi-fibre push on

MSA Multi-Source Agreement

4 Applications for 10 gigabits per second and beyond

The need to support cost-efficient high-speed applications over multimode fibre has resulted in the availability of a wide variety of applications and implementation options.

Multimode options are shown in Table 1, Table 2, and Table 3.

Single-mode options are shown in Table 4, Table 5 and Table 6.

In Annex A, Table A.1 lists all the multimode options and Table A.2 lists all the single mode options.

Table 1 – Multimode applications standardized in IEEE for Ethernet and INCITS for Fibre Channel

Data rate	Duplex fibre applications	Parallel fibre applications	Maximum reach m			Number of fibre pairs
			OM3	OM4	OM5	
10 Gbit/s	10GBASE-SR		300	400		1
16 Gbit/s	16GFC-SW		100	125		1
25 Gbit/s	25GBASE-SR		70	100		1
32 Gbit/s	32GFC-SW		70	100		1
40 Gbit/s		40GBASE-SR4	100	150[a]		4
50 Gbit/s	50GBASE-SR		70	100		1
64 Gbit/s	64GFC-SW		70	100		1
100 Gbit/s		100GBASE-SR2	70	100		2
		100GBASE-SR4	70	100[a]		4
		100GBASE-SR10	100	150[a]		10
200 Gbit/s		200GBASE-SR4	70	100		4
400 Gbit/s		400GBASE-SR16	70	100		16
		400GBASE-SR4.2	70	100	150	4
		400GBASE-SR8	70	100		8

[a] Minimum cabled optical fibre performance of Category OM4 is specified (subject to a maximum total connecting hardware loss of 1,0 dB).

Table 2 – Multimode applications in progress of standardization in IEEE for Ethernet and INCITS for Fibre Channel

Data rate	Duplex fibre applications	Parallel fibre applications	Maximum reach m			Number of fibre pairs
			OM3	OM4	OM5	
128 Gbit/s		128GFC-SW4	70	100	100	4
256 Gbit/s		256GFC-SW	70	100	100	4

Table 3 – Multimode applications covered by Multi-Source Agreements

Data rate	Duplex applications	Parallel applications	Maximum reach m			Number of fibre pairs
			OM3	OM4	OM5	
40 Gbit/s	40G-SWDM4		240	350	440	1
100 Gbit/s	100G-SWDM4		75	100	150	1
400 Gbit/s		400G-BD4.2	70	100	150	4

NOTE The maximum channel attenuation values at the specified reaches for the applications in Table 1, Table 2 and Table 3 can be found in ISO/IEC 11801-1 and/or the relevant application standard or Multi-Source Agreement.

Table 4 – Single-mode applications standardized in IEEE for Ethernet and INCITS for Fibre Channel

Data rate	Single fibre or duplex applications	Parallel applications	Maximum reach for OS2 [a] m	Number of fibre pairs
25 Gbit/s	25GBASE-LR		10 000	1
32 Gbit/s	3200-SM-LC-L		10 000	1
40 Gbit/s	40GBASE-FR		2 000	1
	40GBASE-LR4		10 000	1
50 Gbit/s	50GBASE-FR		2 000	1
	50GBASE-LR		10 000	1
100 Gbit/s	100GBASE-DR		500	1
	100GBASE-LR4		10 000	1
128 Gbit/s		128GFC-PSM4	500	4
	128GFC-CWDM4		2 000	1
200 Gbit/s		200GBASE-DR4	500	4
	200GBASE-FR4		2 000	1
	200GBASE-LR4		10 000	1
400 Gbit/s		400GBASE-DR4	500	4
	400GBASE-FR8		2 000	1
	400GBASE-LR8		10 000	1

[a] OS1a is not listed because the loss budget for 10 000 m applications is insufficient to support this maximum reach using minimally compliant OS1a cabling. Minimally compliant OS1a cabling can support 2 000 m and 500 m applications to their maximum reach by reducing the loss budget allocation for connection and splice loss.

Table 5 – Single-mode applications in progress of standardization in IEEE for Ethernet and INCITS for Fibre Channel

Data rate	Single fibre or duplex applications	Parallel applications	Maximum reach for OS2 [a] m	Number of fibre pairs
64 Gbit/s	64GFC-LW		10 000	1
100 Gbit/s	100GBASE-FR1		2 000	1
	100GBASE-LR1		10 000	1
400 Gbit/s	400GBASE-FR4		2 000	1
	400GBASE-LR4		6 000	1

[a] OS1a is not listed because the loss budget for 10 000 m applications is insufficient to support this maximum reach using minimally compliant OS1a cabling. Minimally compliant OS1a cabling can support 2 000 m and 500 m applications to their maximum reach by reducing the loss budget allocation for connection and splice loss.