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TECHNICAL REPORT

colour inside

Information technology – Generic cabling for customer premises – Part 9909: Evaluation of balanced cabling in support of 25 Gbit/s for reach greater than 30 metres

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FOREWORD

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ISO/IEC TR 11801-9909, which is a Technical Report, has been 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-SC25/2932/DTR	JTC1-SC25/2948/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 publication 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

This document provides an evaluation of balanced cabling in support of 25 Gbit/s data transmission. The evaluation covers enhanced balanced cabling channel specifications, which are based on Category 8.1 and Category 8.2 balanced cabling components. The enhanced channel specifications are intended to support extended reach greater than 30 m.

The extended reach evaluation is intended to support various emerging use-cases including

- 25 Gbit/s LAN,
- extended reach high definition audio/video,
- Wi-Fi®[1] application greater than 10 Gbit/s, and
- 5G intrabuilding sites.

[1] Wi-Fi is a registered trademark of Wi-Fi Alliance. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC.

INFORMATION TECHNOLOGY – GENERIC CABLING FOR CUSTOMER PREMISES –

Part 9909: Evaluation of balanced cabling in support of 25 Gbit/s for reach greater than 30 metres

1 Scope

This part of ISO/IEC 11801, which is a Technical Report, covers evaluation and recommendations for achieving extended reach, greater than 30 m, for 25 Gbit/s applications over balanced cabling channels.

This document covers channel reference implementations, based on Category 8.1 and Category 8.2, 2 000 MHz, components.

The channel and component category specifications covered in this document are not intended to be normative.

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*

3 Terms and definitions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 11801-1 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 https://www.iso.org/obp

3.2 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO/IEC 11801-1 and the following apply.

SNR	signal to noise ratio
NVP	nominal velocity of propagation

4 Extended reach channel specifications

4.1 General

Balanced cabling channels in accordance with ISO/IEC 11801-1:2017, Class I and Class II, are intended to support link data rate operating at 25 Gbit/s – for example, ISO/IEC/IEEE 8802-3:2017/AMD3:2017 25GBASE-T – with link reach up to 30 m.

NOTE 1 ISO/IEC/IEEE 8802-3:2017/AMD3:2017 25GBASE-T link segment specifications are referenced, see ISO/IEC TR 11801-9905.

Class I and Class II balanced cabling channels in accordance with ISO/IEC 11801-1:2017 are implemented using Category 8.1 and Category 8.2 balanced screened cabling components, respectively.

NOTE 2 ISO/IEC/IEEE 8802-3:2017/AMD3:2017 25GBASE-T is defined using Category 8.1 and Category 8.2 (Class I and Class II, respectively) up to 1 250 MHz.

ISO/IEC 11801-1 allows for variation in channel implementation configurations that maintain conformance to channel specifications.

Enhanced channel reference implementations use two connections, with two 2 m, 20 % derated cords attached to the ends of a permanent link, so that the permanent link length is equal to the channel length (in metres) minus 4 m.

Enhanced channels can provide additional SNR margin-to-capacity, which can potentially support additional reach, see Annex B.

NOTE 3 The possibility of additional reach can be verified with manufacturers of specific equipment before deployment.

Extended reach channel reference implementations, greater than 30 m, are evaluated over four reach ranges: ≤ 40 m, ≤ 50 m, ≤ 67 m, and ≤ 100 m; see Table 1.

Balanced cabling covered by this document:

a) is specified in accordance with ISO/IEC 11801-1;

b) is tested in accordance with ISO/IEC 11801-1, i.e. as specified in IEC 61935-1.

4.2 Channel performance enhancement methods for increased SNR

4.2.1 General

Table 1 shows the enhancement method considerations for 25 Gbit/s and 25GBASE-T operation over various extended reach cabling channels using Category 8.1 and Category 8.2 components.

NOTE 25GBASE-T can be supported only by channels which fully conform to the ISO/IEC/IEEE 8802-3:2017/AMD3 25GBASE-T link segment specifications, see 4.2.2.

Table 1 – Enhancement methods for 25 Gbit/s extended reach

	Channel length, L m			
Reach range	30 < L ≤ 40	40 < L ≤ 50	50 < L ≤ 67	68 < L ≤ 100
Application supported	25 Gbit/s and 25GBASE-T	25 Gbit/s	25 Gbit/s	25 Gbit/s
	Recommended channel enhancement method			
Channel component Category 8.1	Reduced delay and delay skew in accordance with 4.2.2.	Reduced delay and delay skew in accordance with 4.2.2, and Enhanced cable in accordance with 4.2.3.	Reduced delay and delay skew in accordance with 4.2.2, Enhanced cable in accordance with 4.2.3, and Enhanced connector in accordance with 4.2.4.	Reduced delay and delay skew in accordance with 4.2.2, Enhanced cable in accordance with 4.2.3, and Enhanced connector in accordance with 4.2.4.
Channel component Category 8.2	Reduced delay and delay skew in accordance with 4.2.2.	Reduced delay and delay skew in accordance with 4.2.2, and Enhanced cable in accordance with 4.2.3.	Reduced delay and delay skew in accordance with 4.2.2, and Enhanced cable in accordance with 4.2.3	Reduced delay and delay skew in accordance with 4.2.2, Enhanced cable in accordance with 4.2.3, and Enhanced connector in accordance with 4.2.4.

4.2.2 Reduced delay and delay skew

Using components with improved propagation delay and delay skew performance compared to those specified in ISO/IEC 11801-1 for Category 8.1 and 8.2 components can provide longer channel lengths than the reference implementations of 30 m, see Annex A.

NOTE Engineered channels made from cable with higher NVP thus have inherently lower delay and delay skew characteristics; thus they can support more physical length, e.g. more than 30 m, while still conforming to all 25GBASE-T link segment specifications, including maximum delay specifications, i.e. 185 ns.

4.2.3 Enhanced cable

Using cables with enhanced RL, IL, TCL, ELTCTL and coupling attenuation compared to ISO/IEC 11801-1 Category 8.1 and 8.2 components specifications can provide longer channel lengths than the reference implementations of 30 m, see Annex B.

4.2.4 Enhanced connector

Using connecting hardware with enhanced RL, IL, TCL, ELTCTL and coupling attenuation compared to ISO/IEC 11801-1 Category 8.1 and 8.2 components specifications can provide longer channel lengths than the reference implementations of 30 m, see Annex B.

4.3 Example channel specifications with length scaling

4.3.1 General

Two informative example extended-reach enhanced channel transmission parameters specifications are given:

a) 50 m using Category 8.1; and

b) 50 m using Category 8.2.