



TECHNICAL REPORT

Information technology – Generic cabling for customer premises –
Part 9906: Balanced single-pair cabling channels up to 600 MHz for single-pair
Ethernet (SPE)

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INFORMATION TECHNOLOGY – GENERIC CABLING FOR CUSTOMER PREMISES –

Part 9906: Balanced single-pair cabling channels up to 600 MHz for single-pair Ethernet (SPE)

FOREWORD

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ISO/IEC TR 11801-9906 has been prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology. It is a Technical Report.

This second edition cancels and replaces the first edition published in 2020. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the addition of ISO/IEC/IEEE 8802-3, 100BASE T1L, long reach;
- b) complete rearrangement of the information contained in Clause 4, Clause 5, Annex A, Annex B, and Annex C.

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

Draft	Report on voting
JTC1-SC25/3279/DTR	JTC1-SC25/3293/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

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.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1, and the ISO/IEC Directives, JTC 1 Supplement available at www.iec.ch/members_experts/refdocs and www.iso.org/directives.

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INTRODUCTION

This document is a compendium of balanced single-pair cabling channel specifications, which support application-specific use in the link-segments specified in ISO/IEC/IEEE 8802-3 single-pair Ethernet (SPE) physical interface (PHY) standards.

The balanced single-pair cabling channels support SPE PHYs as specified in ISO/IEC/IEEE 8802-3, including 1000BASE-T1 Type B, 1000BASE-T1 Type A, 100BASE-T1L, 100BASE-T1, 10BASE-T1L, and 10BASE-T1S.

NOTE At the time of publication, 100BASE-T1L is unpublished.

While the original use case for SPE was automotive applications, this document describes balanced single-pair cabling channels intended for use in non-automotive, SPE applications, for example:

- 1) industrial automation applications, Industrial Internet of Things (IIoT), Industry 4.0;
- 2) enterprise building applications, Internet of Things (IoT), smart lighting, energy management, and access control;
- 3) other IoT applications, smart building, and home automation applications.

SPE cabling channels support bidirectional signal transmission, using one balanced pair, for 1 000 Mbit/s up to 40 m, 100 Mbit/s up to 500 m, or 10 Mbit/s up to 1 000 m, where reach is influenced by cabling channel capacity limitations from signal loss.

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INFORMATION TECHNOLOGY – GENERIC CABLING FOR CUSTOMER PREMISES –

Part 9906: Balanced single-pair cabling channels up to 600 MHz for single-pair Ethernet (SPE)

1 Scope

This document covers cabling channel specifications, for cabling channels constructed from balanced single-pair cabling components, intended for use in:

- 1) industrial automation applications, Industrial Internet of Things (IIoT), Industry 4.0;
- 2) enterprise building applications, Internet of Things (IoT), smart lighting, energy management, and access control;
- 3) other IoT applications, smart building, and home automation applications.

The cabling channel specifications are intended to support ISO/IEC/IEEE 8802-3 single-pair Ethernet (SPE) link segment specifications in the following SPE physical layer specifications (PHYs):

- a) 1000BASE-T1 Type B, with reach up to 40 m;
- b) 1000BASE-T1 Type A, with reach up to 15 m;
- c) 100BASE-T1L, with reach up to 500 m;
- d) 100BASE-T1, with reach up to 15 m;
- e) 10BASE-T1L, with reach up to 1000 m;
- f) 10BASE-T1S, with reach up to 15 m.

NOTE At the time of publication, 100BASE-T1L is unpublished.

The channel component specifications are referenced according to corresponding IEC balanced single-pair cable and connector specifications.

Channel specifications include IL, RL, TCL, coupling attenuation, and alien crosstalk parameters specifications.

The channel EMC related specifications are referenced according to the MICE standard environmental characterization systems specified in ISO/IEC 11801-1.

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, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 11801-1 and the following 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>

3.1.1

balanced single-pair cabling channel

cabling channel constructed from balanced single-pair cables, balanced single-pair connectors and balanced single-pair cords to form a cabling channel intended for use in differential-mode signal transmission and power delivery applications

3.1.2

balanced single-pair cable

cable consisting of a single pair of conductors, optional screen, and overall jacket, primarily intended for use in differential-mode signal transmission and power delivery applications

3.1.3

balanced single-pair connector

connector intended for use with balanced single-pair cable in differential-mode signal transmission and power delivery applications

3.1.4

balanced single-pair cord

cable assembly constructed from a single-pair cable and single-pair connectors

3.2 Symbols

V_{pp} peak-to-peak voltage

4 Single-pair Ethernet (SPE) link segment specifications

4.1 General

The cabling channel specifications are intended to support ISO/IEC/IEEE 8802-3 single-pair Ethernet (SPE) link segment specifications in the SPE physical layer specifications (PHYs) listed in Clause 1.

The information provided in this Clause 4 on single-pair cabling is from ISO/IEC/IEEE 8802-3, which gives additional information.

4.2 Link segment specifications

ISO/IEC/IEEE 8802-3 single-pair Ethernet (SPE) link segment characteristics are summarized in Table 1.

Table 1 – SPE link segment characteristics

SPE link segment	Data rate	Reach	Frequency range	Number of inline connectors	Screen Type
PHY	Mb/s	m	MHz		
1000BASE-T1 Type B	1 000	40	$1 \leq f \leq 600$		Screened and unshielded
1000BASE-T1 Type A	1 000	15	$1 \leq f \leq 600$		Screened and unshielded
100BASE-T1L	100	500	$0,1 \leq f \leq 60$	5	Screened and unshielded
100BASE-T1	100	15	$0,3 \leq f \leq 66$		Screened and unshielded
10BASE-T1L	10	1 000	$0,1 \leq f \leq 20$	10	Screened and unshielded
10BASE-T1S	10	15	$0,1 \leq f \leq 20$		Screened and unshielded

NOTE At the time of publication, 100BASE-T1L is unpublished.

4.3 Environmental classifications

The balanced single-pair cabling specifications referenced in ISO/IEC/IEEE 8802-3 include channel EMC related specifications for electromagnetic isolation levels E_1 , E_2 and E_3 , which are defined according to the MICE standard environmental characterization system specified in ISO/IEC 11801-1.

4.4 SPE link segment signal transmission specifications

4.4.1 SPE link segment return loss (RL)

The SPE link segment return loss (RL) specifications are given in Table 2.