PD ISO/IEC TR 11801-9905:2018



BSI Standards Publication

Information technology – Generic cabling systems for customer premises

Part 9905: Guidelines for the use of installed cabling to support 25GBASE-T application

bsi.

National foreword

This Published Document is the UK implementation of ISO/IEC TR 11801-9905:2018.

The UK participation in its preparation was entrusted to Technical Committee TCT/7, Telecommunications - Installation requirements.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2018
Published by BSI Standards Limited 2018

ISBN 978 0 580 96376 6

ICS 35.200

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 March 2018.

Amendments/corrigenda issued since publication

Date	Text affected

ISO/IEC TR 11801-9905

Edition 1.0 2018-02

TECHNICAL REPORT

Information technology – Generic cabling for customer premises – Part 9905: Guidelines for the use of installed cabling to support 25GBASE-T application

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 35.200

ISBN978-2-8322-5373-1

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD 5
INTRODUCTION 7
1 Scope 8
2 Normative references 8
3 Terms, definitions and abbreviations 8
4 Cabling channel specifications for 25 GBASE-T 9
4.1 General 9
4.2 25GBASE-T application specifications 9
4.2.1 Return loss 9
4.2.2 Insertion loss/attenuation 10
4.2.3 NEXT 11
4.2.4 Attenuation to crosstalk ratio at the near-end (ACR-N) 13
4.2.5 Attenuation to crosstalk ratio at the far-end (ACR-F) 13
4.2.6 Propagation delay 15
4.2.7 Delay skew 15
4.2.8 Unbalance attenuation and coupling attenuation 15
4.2.9 Alien crosstalk 16
4.3 Associated risk of 25GBASE-T operation over installed cabling 17
4.4 Characterization of balanced channels using Category 7_A components 17
4.4.1 General 17
4.4.2 Selection of channels for qualification 18
4.4.3 Return loss 18
4.4.4 Insertion loss 19
4.4.5 Near-end crosstalk loss (NEXT) 19
4.4.6 Attenuation to crosstalk loss ratio near-end (ACR-N) 21
4.4.7 Attenuation to crosstalk ratio far-end (ACR-F) 22
4.4.8 Alien (exogenous) crosstalk 24
4.4.9 Propagation delay 25
4.4.10 Delay skew 25
4.4.11 Coupling attenuation 25
4.4.12 Alien crosstalk and coupling attenuation 26
4.5 Characterization of balanced channels using Category 7 components 26
4.5.1 General 26
4.5.2 Selection of channels for qualification 27
4.5.3 Return loss 27
4.5.4 Insertion loss 28
4.5.5 Near-end crosstalk loss (NEXT) 28
4.5.6 Attenuation to crosstalk loss ratio near-end (ACR-N) 30
4.5.7 Attenuation to crosstalk ratio far-end (ACR-F) 31
4.5.8 Alien (exogenous) crosstalk 33
4.5.9 Propagation delay 34
4.5.10 Delay skew 34
4.5.11 Coupling attenuation 34
4.5.12 Alien crosstalk and coupling attenuation 35
4.6 Characterization of balanced channels using Category 6_A components 35
4.6.1 General 35
4.6.2 Selection of channels for qualification 36

4.6.3 Test specifications for channels made out of Category 6_A components 36
5 Guidance for mitigation procedures to improve the cabling of existing installations 36
5.1 General 36
5.2 Mitigation procedures related to internal noise 36
5.3 Mitigation procedures related to exogenous noise (alien crosstalk) 36
6 Guidance for cabling for new installations 37
Bibliography 38

Table 1 – Return loss for a channel 9
Table 2 –Return loss values for a channel at key frequencies 10
Table 3 – Insertion loss for a channel 10
Table 4 – Insertion loss values for a channel at key frequencies 11
Table 5 – NEXT for a channel 11
Table 6 – NEXT values for a channel at key frequencies 12
Table 7 – PS NEXT for a channel 12
Table 8 – PS NEXT values for a channel at key frequencies 13
Table 9 – ACR-F for a channel 13
Table 10 – ACR-F values for a channel at key frequencies 14
Table 11 – PS ACR -F for a channel 14
Table 12 – PS ACR-F values for a channel at key frequencies 14
Table 13 – Propagation delay for a channel 15
Table 14 – Propagation delay values for a channel at key frequencies 15
Table 15 – Delay skew for a channel 15
Table 16 – PS ANEXT for a channel 16
Table 17 – PS ANEXT values for a channel at key frequencies 16
Table 18 – PS AACR-F for a channel 17
Table 19 – PS AACR-F values for a channel at key frequencies 17
Table 20 – Risk of 25GBASE-T operation over installed cabling channels 17
Table 21 – Formulae for return loss limits for a channel 18
Table 22 – Return loss limits for a channel at key frequencies 18
Table 23 – Formula for insertion loss limits for a channel 19
Table 24 – Insertion loss limits for a channel at key frequencies 19
Table 25 – Formulae for pair-to-pair NEXT limits for a channel 19
Table 26 – Pair-to-pair NEXT limits for a channel at key frequencies 20
Table 27 – Formulae for PS NEXT limits for a channel 20
Table 28 –PS NEXT limits for a channel at key frequencies 20
Table 29 – ACR-N limits for a channel at key frequencies 21
Table 30 – PS ACR-N limits for a channel at key frequencies 22
Table 31 – Formulae for ACR-F limits for a channel 22
Table 32 – ACR-F limits for a channel at key frequencies 23
Table 33 – Formulae for PS ACR-F limits for a channel 23
Table 34 – PS ACR-F limits for a channel at key frequencies 23
Table 35 – Formulae for PS ANEXT limits for a channel 24
Table 36 – PS ANEXT limits for a channel at key frequencies 24

Table 37 – Formula for PS AACR-F limits for a channel 24
Table 38 – PS AACR-F limits for a channel at key frequencies 25
Table 39 – Formula for propagation delay limits for a channel 25
Table 40 – Propagation delay limits for a channel at key frequencies 25
Table 41 – Formula for coupling attenuation limits for a channel 26
Table 42 – Coupling attenuation limits for a channel at key frequencies 26
Table 43 – Alien crosstalk and coupling attenuation 26
Table 44 – Formulae for return loss limits for a channel 27
Table 45 – Return loss limits for a channel at key frequencies 27
Table 46 – Formula for insertion loss limits for a channel 28
Table 47 – Insertion loss limits for a channel at key frequencies 28
Table 48 – Formulae for pair-to-pair NEXT limits for a channel 28
Table 49 – Pair-to-pair NEXT limits for a channel at key frequencies 29
Table 50 – Formulae for PS NEXT limits for a channel 29
Table 51 – PS NEXT limits for a channel at key frequencies 29
Table 52 – ACR-N limits for a channel at key frequencies 30
Table 53- PS ACR-N limits for a channel at key frequencies 31
Table 54 – Formulae for ACR-F limits for a channel 31
Table 55 – ACR-F limits for a channel at key frequencies 32
Table 56 – Formulae for PS ACR-F limits for a channel 32
Table 57 – PS ACR-F limits for a channel at key frequencies 32
Table 58 – Formulae for PS ANEXT limits for a channel 33
Table 59 – PS ANEXT limits for a channel at key frequencies 33
Table 60 – Formula for PS AACR-F limits for a channel 33
Table 61 – PS AACR-F limits for a channel at key frequencies 34
Table 62 – Formula for propagation delay limits for a channel 34
Table 63 – Propagation delay limits for a channel at key frequencies 34
Table 64 – Formula for coupling attenuation limits for a channel 35
Table 65 – Coupling attenuation limits for a channel at key frequencies 35
Table 66 – Alien crosstalk and coupling attenuation for shielded channels 35

© ISO/IEC 2018

INFORMATION TECHNOLOGY – GENERIC CABLING FOR CUSTOMER PREMISES –

Part 9905: Guidelines for the use of installed cabling to support 25GBASE-T application

FOREWORD

1) ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards. Their preparation is entrusted to technical committees; any ISO and IEC member body interested in the subject dealt with may participate in this preparatory work. International governmental and non-governmental organizations liaising with ISO and IEC also participate in this preparation.

2) In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

3) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC and ISO member bodies.

4) IEC, ISO and ISO/IEC publications have the form of recommendations for international use and are accepted by IEC and ISO member bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC, ISO and ISO/IEC publications is accurate, IEC or ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

5) In order to promote international uniformity, IEC and ISO member bodies undertake to apply IEC, ISO and ISO/IEC publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any ISO/IEC publication and the corresponding national or regional publication should be clearly indicated in the latter.

6) ISO and IEC provide no marking procedure to indicate their approval and cannot be rendered responsible for any equipment declared to be in conformity with an ISO/IEC publication.

7) All users should ensure that they have the latest edition of this publication.

8) No liability shall attach to IEC or ISO or its directors, employees, servants or agents including individual experts and members of their technical committees and IEC or ISO member bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication of, use of, or reliance upon, this ISO/IEC publication or any other IEC, ISO or ISO/IEC publications.

9) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

10) Attention is drawn to the possibility that some of the elements of this ISO/IEC publication may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

The main task of the joint technical committee is to prepare International Standards. However, the joint technical committee may propose the publication of a Technical Report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

ISO/IEC TR 11801-9905, 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 website.

This Technical Report has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

This Technical Report is to be read in conjunction with ISO/IEC/IEEE 8802.3:2017/AMD3.

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

© ISO/IEC 2018

INTRODUCTION

This document provides guidance to determine whether and which installed channels will support 25GBASE-T. It takes into account the design goals for 25GBASE-T equipment such as:

a) the frequency signal range up to 1 250 MHz;

b) the support of two-connector channels up to 30 m in length.

The requirements of 25GBASE-T are fully defined in ISO/IEC/IEEE 8802-3:2017/AMD3.

Installed two-connector channels which are characterized up to 1 250 MHz and support all the requirements of the ISO/IEC/IEEE 8802-3:2017/AMD3 link segment are expected to support the 25GBASE-T application.

Characterization of channels using Category 7_A components is described in 4.4.

Characterization of channels using Category 7 components is described in 4.5.

Characterization of channels using Category 6_A components is described in 4.6.

This document also provides mitigation procedures to improve the performance of installed channels to the point where the 25GBASE-T application is supported. Additionally, this document recommends the use of Class I and Class II channels to support 25GBASE-T in new installations.

Class I and Class II channels according to ISO/IEC 11801-1 will support 25GBASE-T without mitigation.

Component requirements are not provided in this document and should not be inferred from the channel limits provided.

© ISO/IEC 2018

INFORMATION TECHNOLOGY – GENERIC CABLING FOR CUSTOMER PREMISES –

Part 9905: Guidelines for the use of installed cabling to support 25GBASE-T application

1 Scope

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

a) provides guidance on how to select and assess installed channels which conform to ISO/IEC 11801-1, and clarify if they also support ISO/IEC/IEEE 8802-3:2017/AMD3 for 25GBASE-T;

b) specifies the methods to assess whether installed channels constructed with Category 7_A, 7, or 6_A components meet the 25GBASE-T requirements;

c) provides guidance to identify which channels are likely to meet the 25GBASE-T requirements to avoid unnecessary testing;

d) provides mitigation techniques to improve the performance of installed channels to meet the 25GBASE-T requirements;

e) provides cabling recommendations for new installations.

NOTE 1 The channel transmission performance specified in this document is derived from the 25GBASE-T requirements in ISO/IEC/IEEE 8802-3:2017/AMD3.

NOTE 2 This document does not re-specify component or channel definitions of ISO/IEC 11801-1.

2 Normative references

The following referenced documents are indispensable for the application 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 systems – Part 1: General requirements*

ISO/IEC/IEEE 8802-3:2017/AMD3, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Standard for Ethernet – Amendment 3: Physical layers and management parameters for 25 Gb/s and 40 Gb/s operation, types 25GBASE-T and 40GBASE-T*

3 Terms, definitions and abbreviations

For the purposes of this document, the terms, definitions and abbreviations 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 http://www.iso.org/obp