

TECHNICAL REPORT

**Information technology – Generic cabling for customer premises –
Part 9906: Balanced 1-pair cabling channels up to 600 MHz for single pair
Ethernet (SPE)**

<https://standards.iteh.ai>

Document Preview

[ISO/IEC TR 11801-9906:2020](https://standards.iteh.ai/catalog/standards/iso/ce9af1b2-c021-4fc8-8549-8b77d311f72f/iso-iec-tr-11801-9906-2020)

<https://standards.iteh.ai/catalog/standards/iso/ce9af1b2-c021-4fc8-8549-8b77d311f72f/iso-iec-tr-11801-9906-2020>





THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2020 ISO/IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about ISO/IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

Document Preview

[ISO/IEC TR 11801-9906:2020](https://standards.iteh.ai/catalog/standards/iso/ce9af1b2-c021-4fc8-8549-8b77d311f72f/iso-iec-tr-11801-9906-2020)

<https://standards.iteh.ai/catalog/standards/iso/ce9af1b2-c021-4fc8-8549-8b77d311f72f/iso-iec-tr-11801-9906-2020>



TECHNICAL REPORT

Information technology – **Generic cabling for customer premises –
Part 9906: Balanced 1-pair cabling channels up to 600 MHz for single pair
Ethernet (SPE)**

Document Preview

[ISO/IEC TR 11801-9906:2020](https://standards.iteh.ai/catalog/standards/iso/ce9af1b2-c021-4fc8-8549-8b77d311f72f/iso-iec-tr-11801-9906-2020)

<https://standards.iteh.ai/catalog/standards/iso/ce9af1b2-c021-4fc8-8549-8b77d311f72f/iso-iec-tr-11801-9906-2020>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 35.200

ISBN 978-2-8322-7843-7

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

CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	9
2 Normative references	9
3 Terms, definitions and symbols.....	9
3.1 Terms and definitions.....	9
3.2 Symbols.....	10
4 Balanced 1-pair cabling channels	10
4.1 General.....	10
4.2 Component specifications	11
4.3 Environmental classifications	11
4.4 Channel reference implementations	12
4.5 Balanced 1-pair cabling channel signal transmission specifications.....	12
4.5.1 Return loss (RL)	12
4.5.2 Insertion loss (IL).....	12
4.5.3 Unbalance attenuation and coupling attenuation	13
4.5.4 Alien (exogenous) crosstalk.....	15
4.5.5 DC loop resistance	16
4.5.6 Propagation delay.....	16
Annex A (informative) Balanced 1-pair cable specifications.....	17
A.1 General.....	17
A.2 Cables using alternative conductor sizes	17
A.3 Balanced 1-pair cable specifications	17
A.3.1 Return loss (RL)	17
A.3.2 Insertion loss (IL).....	18
A.3.3 Unbalance attenuation and coupling attenuation	18
A.3.4 Alien (exogenous) crosstalk.....	20
A.3.5 DC resistance.....	21
A.3.6 Propagation delay.....	21
Annex B (informative) Balanced 1-pair connector specifications.....	22
B.1 General.....	22
B.2 Balanced 1-pair connector specifications	22
B.2.1 Return loss (RL)	22
B.2.2 Insertion loss (IL).....	22
B.2.3 Unbalance attenuation and coupling attenuation	23
B.2.4 Alien (exogenous) crosstalk.....	24
B.2.5 DC resistance (DCR)	25
B.2.6 Propagation delay (delay).....	25
Annex C (informative) Link segment specifications	26
C.1 General.....	26
C.2 Return loss (RL).....	26
C.2.1 1000BASE-T1, ISO/IEC/IEEE 8802-3:2017/AMD4	26
C.2.2 100BASE-T1, ISO/IEC/IEEE 8802-3:2017/AMD1	26
C.2.3 10BASE-T1S, IEEE 802.3cg	26
C.2.4 10BASE-T1L, IEEE 802.3cg	27

C.3	Insertion loss (IL).....	27
C.3.1	1000BASE-T1, ISO/IEC/IEEE 8802-3:2017/AMD4	27
C.3.2	100BASE-T1, ISO/IEC/IEEE 8802-3:2017/AMD1	27
C.4	TCL - 10BASE-T1L, IEEE 802.3cg	28
C.5	ELTCTL - 10BASE-T1L, IEEE 802.3cg	29
C.6	PS ANEXT	29
C.6.1	1000BASE-T1, Type A, ISO/IEC/IEEE 8802-3:2017/AMD4	29
C.6.2	1000BASE-T1, Type B, ISO/IEC/IEEE 8802-3:2017/AMD4	29
C.6.3	100BASE-T1, ISO/IEC/IEEE 8802-3:2017/AMD1	29
C.6.4	10BASE-T1S, IEEE 802.3cg	30
C.6.5	10BASE-T1L, IEEE 802.3cg	30
C.7	PS AACR-F	30
C.7.1	1000BASE-T1, Type A, ISO/IEC/IEEE 8802-3:2017/AMD4	30
C.7.2	1000BASE-T1, Type B, ISO/IEC/IEEE 8802-3:2017/AMD4	30
C.7.3	100BASE-T1, ISO/IEC/IEEE 8802-3:2017/AMD1	31
C.7.4	10BASE-T1S, IEEE 802.3cg	31
C.7.5	10BASE-T1L, IEEE 802.3cg	31
C.8	Coupling attenuation	31
C.8.1	1000BASE-T1, Type A, ISO/IEC/IEEE 8802-3:2017/AMD4	31
C.8.2	1000BASE-T1, Type B, ISO/IEC/IEEE 8802-3:2017/AMD4	32
C.8.3	100BASE-T1, ISO/IEC/IEEE 8802-3:2017/AMD1	32
C.8.4	10BASE-T1S, IEEE 802.3cg	32
C.8.5	10BASE-T1L, IEEE 802.3cg	32
C.9	Delay	33
C.9.1	1000BASE-T1, Type A, ISO/IEC/IEEE 8802-3:2017/AMD4	33
C.9.2	1000BASE-T1, Type B, ISO/IEC/IEEE 8802-3:2017/AMD4	33
C.9.3	10BASE-T1L, IEEE 802.3cg	33
Annex D (informative)	Considerations for balanced 1-pair channels bundled in a 4-pair cabling channel.....	34
Annex E (informative)	Conductor size effects for reduced insertion loss.....	35
E.1	Channel parameters affected by conductor size and AWG	35
E.2	IL parameter variation due to conductor size variation	36
E.3	AWG.....	36
Bibliography	37
Table 1	– SPE signal transmission functional space.....	11
Table 2	– Balanced 1-pair cabling channel return loss (RL).....	12
Table 3	– Balanced 1-pair cabling channel IL.....	13
Table 4	– Balanced 1-pair cabling channel TCL	14
Table 5	– Balanced 1-pair cabling channel ELTCTL	14
Table 6	– Balanced 1-pair cabling channel coupling attenuation	15
Table 7	– Balanced 1-pair cabling channel PS ANEXT	15
Table 8	– Balanced 1-pair cabling channel PS AACR-F	16
Table 9	– Balanced 1-pair cabling channel DC loop resistance	16
Table 10	– Balanced 1-pair cabling channel propagation delay	16
Table A.1	– Balanced 1-pair cable standards	17
Table A.2	– Balanced 1-pair cable RL	18

Table A.3 – Balanced 1-pair cable IL	18
Table A.4 – Balanced 1-pair cable TCL	19
Table A.5 – Balanced 1-pair cable ELTCTL	19
Table A.6 – Balanced 1-pair cable coupling attenuation	20
Table A.7 – Balanced 1-pair cable PS ANEXT	20
Table A.8 – Balanced 1-pair cable PS AACR-F	21
Table A.9 – Balanced 1-pair cable DC resistance	21
Table A.10 – Balanced 1-pair cable propagation delay	21
Table B.1 – Balanced 1-pair connector standards	22
Table B.2 – Balanced 1-pair connector RL	22
Table B.3 – Balanced 1-pair connector IL	23
Table B.4 – Balanced 1-pair connector TCL	23
Table B.5 – Balanced 1-pair connector TCTL	23
Table B.6 – Balanced 1-pair connector coupling attenuation	24
Table B.7 – Balanced 1-pair connector PS ANEXT	24
Table B.8 – Balanced 1-pair connector PS AACR-F	24
Table B.9 – Balanced 1-pair connector DCR	25
Table B.10 – Balanced 1-pair connector delay	25
Table C.1 – Return loss limits for 15 m and 40 m link segment	26
Table C.2 – Return loss limits for 15 m link segment	26
Table C.3 – Return loss limits for 15 m link segment	26
Table C.4 – Return loss limits for 1 000 m link segment	27
Table C.5 – Insertion loss limits of a 15 m and 40 m link segment	27
Table C.6 – Insertion loss limits for a 15 m link segment	27
Table C.7 – Insertion loss limits for a 15 m link segment	28
Table C.8 – Insertion loss limits for a 1 000 m link segment	28
Table C.9 – TCL for a 1 000 m link segment	28
Table C.10 – ELTCTL for a 1 000 m link segment	29
Table C.11 – PS ANEXT for a 15 m link segment	29
Table C.12 – PS ANEXT for a 40 m link segment	29
Table C.13 – PS ANEXT for a 15 m link segment	29
Table C.14 – PS ANEXT for a 15 m link segment	30
Table C.15 – PS ANEXT for a 1 000 m link segment	30
Table C.16 – PS AACR-F for a 15 m link segment	30
Table C.17 – PS AACR-F for a 40 m link segment	30
Table C.18 – PS AACR-F for a 15 m link segment	31
Table C.19 – PS AACR-F for a 15 m link segment	31
Table C.20 – PS AACR-F for a 1 000 m link segment	31
Table C.21 – Coupling attenuation for a 15 m link segment	31
Table C.22 – Coupling attenuation for a 40 m link segment	32
Table C.23 – Coupling attenuation for a 15 m link segment	32
Table C.24 – Coupling attenuation for a 15 m link segment	32
Table C.25 – Coupling attenuation for a 1 000 m link segment	32