



BSI Standards Publication

## Information technology – Generic cabling systems for customer premises

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Part 9903: Matrix modelling of channels and links

## National foreword

This Published Document is the UK implementation of ISO/IEC TS 11801-9903:2021. It supersedes PD ISO/IEC TR 11801-9903:2015, which is withdrawn.

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

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## TECHNICAL SPECIFICATION



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Part 9903: Matrix modelling of channels and links**

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## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	9
2 Normative references .....	9
3 Terms, definitions and abbreviated terms .....	9
3.1 Terms and definitions.....	9
3.2 Symbols and abbreviated terms .....	10
4 Matrix model.....	11
5 Matrix definition .....	11
5.1 General.....	11
5.2 Quadriports.....	11
5.3 Matrix port definition for a two-pair system representative for modelling purposes.....	11
5.4 Operational scattering matrix .....	12
5.5 General naming convention.....	12
5.6 S-matrix.....	13
5.7 Passivity .....	13
5.8 Operational reflection loss matrix.....	14
5.9 Transmission matrix (T-matrix).....	14
5.10 S-matrix of cabling.....	14
6 Calculation with matrices using limit lines .....	15
7 Extracting limit lines .....	15
8 General case using mixed-mode matrices.....	16
8.1 General.....	16
8.2 M-parameters .....	16
9 Submatrix DD .....	17
9.1 General.....	17
9.2 Equations to extract the cabling limit lines .....	17
9.2.1 General .....	17
9.2.2 Operational attenuation .....	17
9.2.3 Near-end crosstalk .....	17
9.2.4 Attenuation to far-end crosstalk ratio .....	17
9.2.5 Reflection (RL) .....	18
10 Component values to be used as input to the model.....	18
10.1 General.....	18
10.2 Cable.....	19
10.2.1 General .....	19
10.2.2 Wave attenuation.....	19
10.2.3 Near-end crosstalk .....	19
10.2.4 Far-end crosstalk.....	19
10.2.5 Reflection .....	20
10.3 Connections.....	21
10.3.1 General .....	21
10.3.2 As a point source of disturbance.....	21
10.3.3 As a transmission line.....	21
11 Submatrices CC, CD and DC.....	22

11.1	General.....	22
11.2	Submatrix CD .....	22
11.3	Submatrix DC .....	22
11.4	Submatrix CC .....	22
Annex A (informative) Matrix conversion formulas.....		23
A.1	Overview.....	23
A.2	Formulas.....	23
A.2.1	Mixed-mode to T-matrix .....	23
A.2.2	T-matrix to M-matrix .....	23
A.2.3	Conversion matrices .....	23
Annex B (normative) Channel and permanent link models for balanced cabling .....		5
B.1	General.....	25
B.2	Insertion loss .....	25
B.2.1	Insertion loss of the channel configuration .....	25
B.2.2	Insertion loss of the permanent link configurations.....	26
B.2.3	Assumptions for insertion loss .....	26
B.3	NEXT.....	27
B.3.1	NEXT of the channel configuration.....	27
B.3.2	NEXT of the permanent link configurations .....	27
B.3.3	Assumptions for NEXT.....	28
B.4	ACR-F .....	31
B.4.1	ACR-F of the channel configuration .....	31
B.4.2	ACR-F for the permanent link configurations.....	31
B.4.3	Assumptions for ACR-F .....	32
B.5	No Return loss.....	32
B.5.1	Return loss of the channel and permanent link configurations.....	32
B.5.2	Assumptions for the return loss circuit analysis method .....	33
B.6	PS ANEXT link modelling.....	36
B.6.1	General .....	36
B.6.2	PS ANEXT between connectors.....	36
B.6.3	PS ANEXT between cable segments .....	36
B.6.4	Principles of link modelling .....	36
B.7	PS AACR-F link modelling .....	37
B.7.1	General .....	37
B.7.2	PS AFEXT between connectors .....	37
B.7.3	PS AACR-F between cable segments .....	37
B.7.4	Principles of link modelling .....	37
B.7.5	Impact of PS AACR-F in channels and links with substantially different lengths .....	38
B.8	Component assumptions for modelling purposes.....	41
Annex C (informative) Terms and definitions.....		43
C.1	Comparison of namings .....	43
C.2	General.....	44
C.3	Background of terms and definitions .....	44
C.3.1	Operational attenuation .....	44
C.3.2	Operational transfer function ( $T_B$ ).....	46
C.3.3	Image or wave transfer function ( $T$ ) .....	46
C.3.4	Insertion transfer function of a two-port ( $T_{BI}$ ).....	46

C.3.5	Insertion transfer function ( $T_{BI}$ ) measured with a vector network analyser .....	46
C.3.6	Operational reflection loss transfer function ( $T_{ref} = S_{ref}$ ) of a junction.....	46
	Bibliography.....	48
Figure 1	– Link configurations of ISO/IEC 11801-1.....	7
Figure 2	– Matrix definition of a 4-port two twisted pair system .....	12
Figure 3	– Operational scattering parameters example from port 2 .....	12
Figure 4	– Transmission matrix concatenation showing an example of a 2-connector permanent link .....	14
Figure 5	– Graphical example of a NEXT calculation showing statistical results (red) and final calculation (blue).....	16
Figure 6	– One pair M-matrix showing the submatrices .....	16
Figure 7	– 100 m cable return loss without reflection at both ends .....	20
Figure 8	– 100 m cable return loss with a reflection of 0,03 at both ends ( $\Gamma_{\Omega}$ mismatch, ~23 dB return loss at 1 MHz).....	21
Figure A.1	– X matrices .....	24
Figure B.1	– Example of computation of NEXT with higher precision.....	28
Figure B.2	– Example of increased impact of PS AFEXT.....	38
Figure C.1	– Defining the operational attenuation and the operational transfer functions of a two-port .....	45
Figure C.2	– Defining the reflection transfer functions and the return loss of a junction.....	47
Table 1	– All four ports operational scattering parameter definition .....	12
Table 2	– Equal S-parameters for real components.....	13
Table B.1	– Insertion loss deviation .....	26
Table B.2	– Modelling assumptions for cable transmission parameters .....	41
Table B.3	– Model input assumptions used in the statistical calculation (Class E <sub>A</sub> ).....	41
Table B.4	– Model input assumptions used in the statistical calculation (Class F <sub>A</sub> ).....	42
Table C.1	– Comparison of naming in ISO/IEC 11801-1 and ISO/IEC TS 11801-9903.....	43

## INFORMATION TECHNOLOGY – GENERIC CABLING SYSTEMS FOR CUSTOMER PREMISES –

### Part 9903: Matrix modelling of channels and links

#### FOREWORD

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ISO/IEC TS 11801-9903 has been prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology. It is a Technical Specification.

This first edition of ISO/IEC TS 11801-9903 cancels and replaces ISO/IEC TR 11801-9903 published in 2015. This edition constitutes a technical revision.

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

- a) the addition of further clarifications of the relations of parameters described in this edition and referenced analogous parameters in IEC TR 62152, e.g. operational attenuation versus operational transfer loss;
- b) the introduction and description of the higher order M-parameters  $8 \times 8$  matrix of mixed-mode parameters, which includes the  $4 \times 4$  submatrix of 4-port differential-mode-to-differential-mode (DD) parameters, among three other submatrices of mixed-mode parameters;
- c) Annex A, matrix conversion formulas, covers up to 16-port parameters matrices;
- d) the expanded Annex B description of example calculations for channel and permanent link, and updated component parameter tables.

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 web sites.

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

Draft	Report on voting
JTC1-SC25/2959/DTS	JTC1-SC25/2993/RVDTS

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 Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs).

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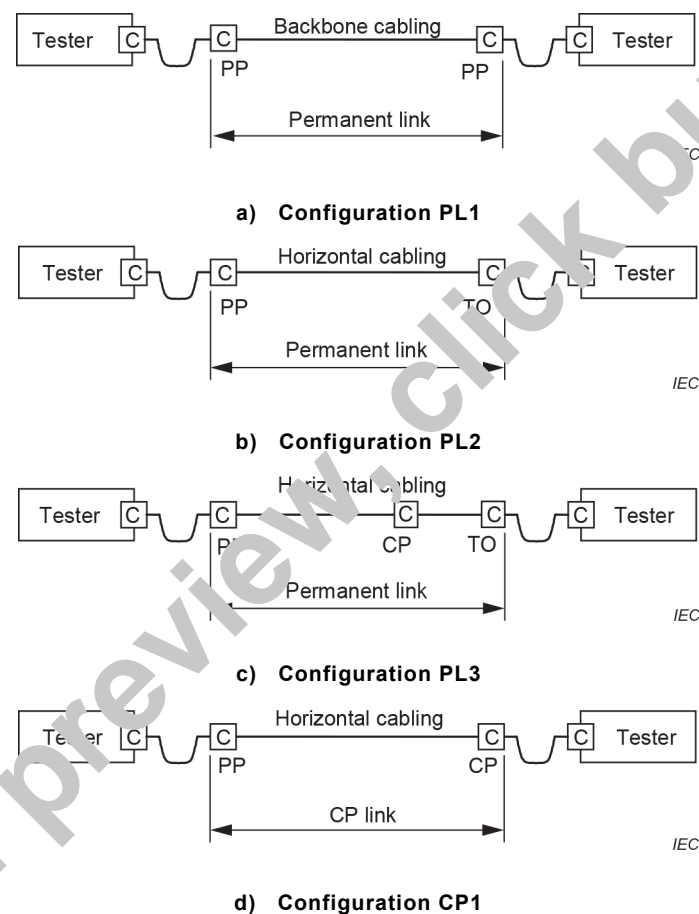
## INTRODUCTION

The pass/fail limits for defined channel and permanent link cabling configurations have an implicit impact on the component limits for the cabling components used. The channel configurations and the link configurations are specified in ISO/IEC 11801-1:2017, Clause 6 and Clause 7, respectively.

The permanent link configurations, which represent the fixed portion of the cabling, have two possible topologies:

- a connection plus a segment of cable plus a connection (2-connector topology);
- a connection plus a segment of cable plus a connection plus another segment of cable plus another connection (3-connector topology).

The link configurations of ISO/IEC 11801-1 are shown in Figure 1.



**Figure 1 – Link configurations of ISO/IEC 11801-1**

This document includes models and assumptions, which support pass/fail limits for the channel and permanent link test configurations in ISO/IEC 11801-1. These are based on the performance requirements of cable and connecting hardware as specified in IEC standards.

This document provides reasonable assurance that a channel created by adding compliant patch cords to a previously certified permanent link will meet the applicable channel performance limits.

Over the years the frequencies of the classes increased, but the theory for calculating the limits stayed the same. Especially the higher order effects had to be considered and in the end only by doing a Monte Carlo calculation, assuming that not all components would be at the limit at the same time, allowed compliance to be proved.

The model uses two pairs for all calculations. The limits are equal for pairs or pair combinations but in reality measured values could be different. If results are required that need more pairs to be considered, then this calculation can be done based on the results from multiple two-pair calculations with appropriate inputs (worst case). An example of such a calculation is the power sum and average limit lines for four pairs.

Symmetry and additional contributions that result from unbalanced signals and differential-to-common and common-to-differential mode coupling are included in this document by increasing the matrix size.

For details on the naming of transmission parameters, see Clause 3 and Clause C.1.

# INFORMATION TECHNOLOGY – GENERIC CABLING SYSTEMS FOR CUSTOMER PREMISES –

## Part 9903: Matrix modelling of channels and links

### 1 Scope

This part of ISO/IEC 11801, which is a Technical Specification, establishes a matrix-model for formulating limits for mixed-mode parameters within and between two pairs of balanced cabling. This is for the purpose of supporting new, improved balanced cabling channel and link specifications.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 abbreviated terms

#### 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 <http://www.iso.org/obp>

##### 3.1.1

##### **attenuation**

diminishing of signal strength

Note 1 to entry: Details need to be added to indicate the exact usage.

##### 3.1.2

##### **connection**

two mated connectors

EXAMPLE Jack and plug.

##### 3.1.3

##### **image attenuation**

##### **wave attenuation**

attenuation when a two-port is terminated by its input and output characteristic impedances with no reflections at input and output

Note 1 to entry: The wave attenuation of cables is length scalable.