
**Information technology —
Telecommunications and information
exchange between systems — Close
capacitive coupling communication
physical layer (CCCC PHY)**

*Technologies de l'information — Téléinformatique — Couche
physique pour communication par couplage capacitif fermé*





COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier; Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviated terms	1
3.1 Terms and definitions.....	1
3.2 Abbreviated terms.....	1
4 Conventions and notations	2
5 Conformance	2
6 Architecture	2
7 Reference plate-electrode assembly	5
8 PHY parameters	6
8.1 Voltage conditions.....	6
8.2 Bit representation.....	6
8.2.1 Bit duration.....	6
8.2.2 Bit encoding.....	7
8.3 Transmission.....	7
8.4 DC balance of a P-PDU.....	7
8.5 Reception of a P-PDU.....	8
9 P-PDU	8
9.1 Structure.....	8
9.2 Space.....	8
9.3 Level adjust.....	8
9.4 Pre-amble and Sync.....	9
9.5 Attribute.....	9
9.6 TDS number.....	10
9.7 Sequence number.....	10
9.7.1 Initial and range.....	10
9.7.2 Acknowledgement.....	10
9.8 Payload.....	10
9.9 CRC.....	10
9.10 Post-amble.....	10
9.11 Null P-PDU.....	10
9.12 Data P-PDU.....	10
10 PHY data unit (P-DU)	10
11 Segmentation and reassembly	11
12 TDS	11
13 LBT and synchronisation	12
13.1 LBT.....	12
13.2 Synchronisation.....	12
14 Association procedure	13
15 Communication	15
15.1 General.....	15
15.2 Full duplex communication.....	15
15.3 Broadcast communication.....	17
Annex A (normative) Tests	19
Annex B (informative) Guidance for implementation of this document	57
Bibliography	58

Foreword

ISO (the International Organization for Standardization) and IEC (the 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 through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems* in cooperation with Ecma International.

This second edition cancels and replaces the first edition (ISO/IEC 17982:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

- The document has been fully aligned with the editorial rules in ISO/IEC Directives, Part 2.
- [Annex B](#) has been added to guide an implementation for small size and low power devices.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Information technology — Telecommunications and information exchange between systems — Close capacitive coupling communication physical layer (CCCC PHY)

1 Scope

This document specifies the close capacitive coupling communication physical layer (CCCC PHY) for full duplex and broadcast communication in time slots on frequency division multiplex channels.

NOTE An implementation for small size and low power devices is provided in [Annex B](#).

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 7498-1, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model*

ITU-T Rec. V.41, *Data communication over the telephone network — Code-independent error-control system*

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 7498-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1.1

listener

entity that does not initiate communication

3.1.2

talker

entity that initiates communication

3.2 Abbreviated terms

CRC	cyclic redundancy check
CCCC	close capacitive coupling communication
DUT	device under test