
**Cards and security devices for
personal identification — Contactless
proximity objects —**

**Part 4:
Transmission protocol**

*Cartes et dispositifs de sécurité pour l'identification personnelle —
Objets sans contact de proximité —*

Partie 4: Protocole de transmission

IT Standard
(<https://standards.iteh.ai>)
Document Preview

[ISO/IEC 14443-4:2018](https://standards.iteh.ai/catalog/standards/iso/c7f2a1b2-7897-4192-9d76-36ca3e7f657f/iso-iec-14443-4-2018)

<https://standards.iteh.ai/catalog/standards/iso/c7f2a1b2-7897-4192-9d76-36ca3e7f657f/iso-iec-14443-4-2018>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO/IEC 14443-4:2018](https://standards.iteh.ai/catalog/standards/iso/c7f2a1b2-7897-4192-9d76-36ca3e7f657f/iso-iec-14443-4-2018)

<https://standards.iteh.ai/catalog/standards/iso/c7f2a1b2-7897-4192-9d76-36ca3e7f657f/iso-iec-14443-4-2018>



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2018

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
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols, abbreviated terms and notation	2
4.1 Symbols and abbreviated terms.....	2
4.2 Notations.....	4
5 Protocol activation of PICC Type A	5
5.1 Activation sequences.....	5
5.2 Request for answer to select.....	6
5.3 Answer to select.....	7
5.3.1 Structure of the bytes.....	8
5.3.2 Length byte.....	8
5.3.3 Format byte.....	8
5.3.4 Interface byte TA(1).....	9
5.3.5 Interface byte TB(1).....	9
5.3.6 Interface byte TC(1).....	10
5.3.7 Historical bytes.....	11
5.4 Protocol and parameter selection request.....	11
5.4.1 Start byte.....	11
5.4.2 Parameter 0.....	11
5.4.3 Parameter 1.....	12
5.5 Protocol and parameter selection response.....	12
5.6 Activation frame waiting time.....	13
5.7 Error detection and recovery.....	13
5.7.1 Handling of RATS and ATS.....	13
5.7.2 Handling of PPS request and PPS response.....	13
5.7.3 Handling of the CID during activation.....	14
6 Protocol activation of PICC Type B	14
7 Half-duplex block transmission protocol	15
7.1 Elements and mechanisms.....	15
7.2 Block format.....	15
7.2.1 Length field.....	16
7.2.2 Prologue field.....	16
7.2.3 Information field.....	19
7.2.4 Epilogue field.....	19
7.3 Frame waiting time.....	19
7.4 Frame waiting time extension.....	20
7.5 Power level indication.....	21
7.6 Protocol operation.....	21
7.6.1 S(PARAMETERS) blocks.....	21
7.6.2 Multi-Activation.....	23
7.6.3 Chaining.....	23
7.6.4 Block numbering rules.....	24
7.6.5 Block handling rules.....	25
7.6.6 PICC presence check.....	26
7.6.7 Error detection and recovery.....	26
8 Protocol deactivation of PICC Type A and Type B	27
8.1 Deactivation frame waiting time.....	27
8.2 Error detection and recovery.....	27

9	Activation of bit rates and framing options in PROTOCOL state	27
10	Frame with error correction	30
10.1	General.....	30
10.2	Type A PCD frame format for bit rates up to $fc/16$ and higher than $fc/2$ and Type A PICC frame format for all bit rates.....	30
10.3	Type A PCD frame format for bit rates of $fc/8$, $fc/4$ and $fc/2$ and Type B PCD and PICC frame format for all bit rates.....	31
10.4	Enhanced block with error correction.....	31
10.4.1	General.....	31
10.4.2	Modified Hamming sub-block format.....	31
10.4.3	Hamming control byte.....	31
10.4.4	Hamming control generation matrix A	32
10.4.5	Hamming control bits calculation.....	32
10.4.6	Hamming control check matrix H	32
10.4.7	Error correction.....	33
10.5	Activation of frame with error correction in PROTOCOL state.....	33
Annex A (informative) Multi-Activation example		37
Annex B (informative) Protocol scenarios		38
Annex C (informative) Block and frame coding overview		47
Annex D (deliberately left blank)		49
Annex E (informative) CRC_32 encoding		50
Annex F (informative) Frame with error correction		52
Annex G (informative) Framing options		54
Bibliography		55

Document Preview

ISO/IEC 14443-4:2018

<https://standards.iteh.ai/catalog/standards/iso/c7f2a1b2-7897-4192-9d76-36ca3e7f657f/iso-iec-14443-4-2018>

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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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).

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).

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

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by ISO/IEC JTC 1, *Information technology*, SC 17, *Cards and security devices for personal identification*.

This fourth edition cancels and replaces the third edition (ISO/IEC 14443-4:2016), which has been technically revised.

A list of all the parts in the ISO/IEC 14443 series can be found on the ISO website.

Introduction

The ISO/IEC 14443 series of standards describes the parameters for identification cards or objects for international interchange.

The protocol, as defined in this document, is capable of transferring the application protocol data units as defined in ISO/IEC 7816-4. Thus, application protocol data units and application selection may be used as defined in ISO/IEC 7816-4.

The ISO/IEC 14443 series of standards is intended to allow operation of proximity cards in the presence of other contactless cards or objects conforming to the ISO/IEC 10536 series of standards and the ISO/IEC 15693 series of standards and near field communication (NFC) devices conforming to ISO/IEC 18092 and ISO/IEC 21481.

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO/IEC 14443-4:2018](https://standards.iteh.ai/catalog/standards/iso/c7f2a1b2-7897-4192-9d76-36ca3e7f657f/iso-iec-14443-4-2018)

<https://standards.iteh.ai/catalog/standards/iso/c7f2a1b2-7897-4192-9d76-36ca3e7f657f/iso-iec-14443-4-2018>

Cards and security devices for personal identification — Contactless proximity objects —

Part 4: Transmission protocol

1 Scope

This document specifies a half-duplex block transmission protocol featuring the special needs of a contactless environment and defines the activation and deactivation sequence of the protocol.

This document is intended to be used in conjunction with other parts of ISO/IEC 14443 and is applicable to proximity cards or objects of Type A and Type 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 7816-3, *Identification cards — Integrated circuit cards — Part 3: Cards with contacts — Electrical interface and transmission protocols*

ISO/IEC 7816-4:2013, *Identification cards — Integrated circuit cards — Part 4: Organization, security and commands for interchange*

ISO/IEC 14443-2¹⁾, *Cards and security devices for personal identification — Contactless proximity objects — Part 2: Radio frequency power and signal interface*

ISO/IEC 14443-3, *Cards and security devices for personal identification — Contactless proximity objects — Part 3: Initialization and anticollision*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

bit duration

one elementary time unit (etu), calculated by the following formula:

$$1 \text{ etu} = 128 / (D \times fc)$$

Note 1 to entry: The initial value of the divisor D is 1, giving the initial etu as follows:

$$1 \text{ etu} = 128 / fc$$

1) Fourth edition to be published. Current stage: 40.60.