INTERNATIONAL STANDARD

ISO/IEC 18092

Third edition
2023-12

Telecommunications and information exchange between systems — Near Field Communication Interface and Protocol 1 (NFCIP-1)

Télécommunications et échange d'information entre systèmes — Interface et protocole 1 de communication en champ proche (NFCIP-1)

Reference number
ISO/IEC 18092:2023(E)

© ISO/IEC 2023



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2023

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

© ISO/IEC 2023 – All rights reserved

Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols and abbreviated terms **3**
5 Conventions and notations **6**
5.1 Representation of numbers 6
5.2 Names 6
6 Conformance **6**
7 General **6**
8 RF field **6**
8.1 Values 6
8.2 Passive communication mode 7
8.3 Active communication mode 7
8.4 External RF field detection 7
9 RF signal interface **7**
9.1 General 7
9.2 Bit duration 7
9.3 Active communication mode 8
9.3.1 General 8
9.3.2 Requirements for $f_c/128$ 8
9.3.3 Requirements for $f_c/64$ and $f_c/32$ 8
9.4 Passive communication mode 9
9.4.1 Requirements for $f_c/128$ 9
9.4.2 Requirements for $f_c/64$ and $f_c/32$ 10
10 General Protocol flow **10**
11 Initialisation **11**
11.1 General 11
11.2 RFCA 12
11.2.1 General 12
11.2.2 Initial RFCA 12
11.2.3 RFCA 13
11.3 Passive communication mode 14
11.3.1 Initialisation and SDD for $f_c/128$ 14
11.3.2 Initialisation and SDD for $f_c/64$ and $f_c/32$ 14
11.4 Active communication mode 17
11.4.1 Initialisation 17
11.4.2 Active communication mode RFCA 17
12 Transport protocol **18**
12.1 General 18
12.2 Transport Data 18
12.3 Passive communication mode Activation flow 19
12.4 Active communication mode Activation flow 20
12.5 Commands 22
12.6 Activation of the protocol 23
12.6.1 Attribute Request and Response Commands 23
12.6.2 Wakeup Request and Response Commands 29
12.6.3 Parameter Selection Request and Response Commands 31

© ISO/IEC 2023 – All rights reserved

12.7 Data Exchange Protocol 33
12.7.1 Data Exchange Protocol Request and Response 33
12.7.2 Response timeout extension 38
12.7.3 Attention — Target present 38
12.7.4 Protocol operation 38
12.7.5 Multi-Activation 38
12.7.6 More information (Chaining) 39
12.8 Deactivation of the protocol 39
12.8.1 General 39
12.8.2 Deselect Request and Response command 40
12.8.3 Release Request and Response commands 41
Annex A (normative) **CRC calculation** **43**
Annex B (informative) **SAK** **45**
Bibliography **46**

© ISO/IEC 2023 – All rights reserved

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).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and https://patents.iec.ch. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

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*.

This third edition cancels and replaces the second edition (ISO/IEC 18092:2013), which has been technically revised. It also incorporates ISO/IEC 18092:2013/Cor 1:2015.

The main changes are as follows:

— adoption of near field communication (NFC) security standard for the Target;

— harmonization with the NFC Forum Digital Protocol Technical Specification[2] and Activity Technical Specification[3].

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.

© ISO/IEC 2023 – All rights reserved

Introduction

This document specifies the interface and protocol for simple wireless communication between close coupled devices. These Near Field Communication (NFC) devices communicate with bit rates of 106, 212 and 424 kbit/s (f_c/128, f_c/64 and f_c/32).

This allows, but does not specify, applications in network products and consumer equipment.

The first edition of ISO/IEC 18092 was prepared by Ecma International (as ECMA-340) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1/SC 6 in parallel with its approval by national bodies of ISO and IEC. The second edition of ISO/IEC 18092 was maintained by ISO/IEC JTC 1/SC 6 and Ecma International. This third edition of ISO/IEC 18092 is maintained by ISO/IEC JTC 1/SC 6 with the goal to be harmonized with the NFC Forum Digital Protocol Technical Specification[2] and Activity Technical Specification[3] maintaining backward compatibility, to enable the NFC security feature and to incorporate clarifications on timings of radio frequency (RF) field switched off.

© ISO/IEC 2023 – All rights reserved

Telecommunications and information exchange between systems — Near Field Communication Interface and Protocol 1 (NFCIP-1)

1 Scope

This document defines:

— communication modes for Near Field Communication Interface and Protocol 1 (NFCIP-1) using inductive coupled devices operating at the centre frequency of 13,56 MHz for interconnection of computer peripherals;

— both the active and the passive communication modes of NFCIP-1 to realize a communication network using Near Field Communication (NFC) devices for networked products and for consumer equipment;

— a transport protocol including protocol activation and data exchange methods.

This document specifies:

— modulation schemes;

— codings;

— bit rates;

— frame format of the radio frequency (RF) interface;

— initialisation schemes and conditions required for data collision control during initialisation.

Information interchange between systems is based on agreement between the interchange parties upon the interchange codes and the data structure.

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 13157-1, *Information technology — Telecommunications and information exchange between systems — NFC Security — Part 1: NFC-SEC NFCIP-1 security services and protocol*

ISO/IEC 14443-2:2020, *Cards and security devices for personal identification — Contactless proximity objects — Part 2: Radio frequency power and signal interface*

ISO/IEC 14443-3:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 3: Initialization and anticollision*

ITU-T V.41:1988, *Code-independent error-control system*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 14443-2 and ISO/IEC 14443-3, and the following apply.

© ISO/IEC 2023 – All rights reserved