



Technical Specification

ISO/IEC TS 23220-4

Cards and security devices for personal identification — Building blocks for identity management via mobile devices —

Part 4: Protocols and services for operational phase

*Cartes et dispositifs de sécurité pour l'identification des
personnes — Blocs fonctionnels pour la gestion des identités via
les dispositifs mobiles —*

Partie 4: Protocoles et services pour la phase opérationnelle

**First edition
2026-04**



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2026

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 | v |
| Introduction | vi |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms and definitions | 3 |
| 4 Symbols and abbreviations | 4 |
| 5 Overview | 4 |
| 5.1 General..... | 4 |
| 5.2 Operational sub-phases..... | 4 |
| 5.3 Interfaces..... | 6 |
| 5.3.1 Interface and protocols for the engagement sub-phase..... | 6 |
| 5.3.2 Interface and protocols for the communication sub-phase..... | 6 |
| 5.4 Additional methods and operations..... | 6 |
| 5.5 Trust model..... | 6 |
| 6 Data encoding and parsing of data structures and data elements | 7 |
| 6.1 General..... | 7 |
| 6.2 CBOR encoding..... | 7 |
| 6.3 JSON encoding..... | 8 |
| 6.4 Parsing encoding information..... | 8 |
| 6.5 Engagement for proximity transmission..... | 8 |
| 6.5.1 General..... | 8 |
| 6.5.2 Engagement structures..... | 8 |
| 6.5.3 QR and QR reverse handover..... | 16 |
| 6.5.4 NFC static and negotiated handover..... | 16 |
| 6.5.5 Timeout..... | 19 |
| 6.6 Browser to App engagement (over the Internet)..... | 19 |
| 6.6.1 General..... | 19 |
| 6.6.2 Engagement structures..... | 19 |
| 6.6.3 Deep links URL with URISchemes..... | 19 |
| 6.6.4 Deep link URLs that resolve to a specific App..... | 20 |
| 6.6.5 Profile specific methods..... | 20 |
| 7 Device retrieval | 21 |
| 7.1 General..... | 21 |
| 7.1.1 Operation..... | 21 |
| 7.1.2 End to end encryption..... | 21 |
| 7.2 Operation messages..... | 21 |
| 7.2.1 Device request..... | 21 |
| 7.2.2 Device response..... | 26 |
| 7.2.3 Device Engagement message..... | 31 |
| 7.2.4 OID4VP Authorization request..... | 32 |
| 7.2.5 Credential holder verification..... | 32 |
| 7.3 E2EE transport messages..... | 35 |
| 7.3.1 Session Establishment..... | 35 |
| 7.3.2 Session data..... | 35 |
| 7.3.3 JWT Secured Authorization Response Mode (JARM)..... | 36 |
| 7.4 Device retrieval using proximity transport..... | 36 |
| 7.4.1 NFC..... | 36 |
| 7.4.2 BLE..... | 37 |
| 7.4.3 Wi-Fi Aware..... | 42 |
| 7.5 Device retrieval over the Internet..... | 44 |
| 7.5.1 Device retrieval with E2EE for both request and response..... | 44 |
| 7.5.2 OpenID for Verifiable Presentation..... | 46 |

| | | |
|---------------------|--|------------|
| 8 | Server retrieval | 46 |
| 8.1 | General..... | 46 |
| 8.2 | Data retrieval using WebAPI..... | 47 |
| 8.2.1 | Overview | 47 |
| 8.2.2 | Server retrieval mdoc request..... | 48 |
| 8.2.3 | server retrieval mdoc response..... | 49 |
| 8.3 | Data retrieval using OpenID connect (OIDC)..... | 50 |
| Annex A | (normative) Security mechanisms | 51 |
| Annex B | (normative) Creating a compliant profile | 70 |
| Annex C | (informative) Photo ID profile | 80 |
| Annex D | (informative) Engagement structures | 86 |
| Annex E | (normative) Device retrieval CDDL structures and examples | 88 |
| Annex F | (informative) Examples | 98 |
| Bibliography | | 104 |

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 17, *Cards and security devices for personal identification*.

A list of all parts in the ISO/IEC 23220 series can be found on the ISO and IEC websites.

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.

Introduction

This document covers the operational phase introduced by ISO/IEC 23220-1. This document also expands on ISO/IEC 18013-5, especially regarding reader engagement, over the internet device retrieval operation and connections to other International Standards. It also expands operational data elements, such as for credential holder authentication, operations involving data elements from identical or different types of documents, and more.

Implementation conformant to ISO/IEC 18013-5 meets all requirements on selected building blocks specified in this document.

Cards and security devices for personal identification — Building blocks for identity management via mobile devices —

Part 4: Protocols and services for operational phase

1 Scope

This document specifies building blocks for the implementation of the operational phase of mobile eID systems and any other mdoc for national bodies or document-specific standards to create profiles according to their needs.

This document specifies the interface between the mdoc app and mdoc reader and the interface between the mdoc reader and the issuing authority infrastructure.

More specifically, this document defines transport protocols for various RF solutions and for over the internet. It defines the application layers, such as the request-response protocols between an mdoc app and mdoc reader and between an mdoc reader and issuing authority.

It further defines the security mechanism for issuer authentication, mdoc authentication and credential holder verification.

This document also specifies mechanisms enabling parties other than the issuing authority to:

- use a machine to obtain the mdoc data;
- bind the mdoc to the mdoc holder;
- authenticate the origin of the mdoc data;
- verify the integrity of the mdoc data.

The following items are out of scope for this document:

- provisioning of the mdoc data (this is covered by ISO/IEC TS 23220-3);
- how holder's consent to share data is obtained;
- requirements on storage of mdoc data and mdoc private keys.

Finally, it provides information to create a conformant profile.

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 7816-4:2020, *Identification cards — Integrated circuit cards — Part 4: Organization, security and commands for interchange*

ISO/IEC TS 23220-4:2026(en)

ISO/IEC 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

ISO/IEC 10118-3, *IT Security techniques — Hash-functions — Part 3: Dedicated hash-functions*

ISO/IEC 18004, *Information technology — Automatic identification and data capture techniques — QR code bar code symbology specification*

ISO/IEC 23220-1:2023, *Cards and security devices for personal identification — Building blocks for identity management via mobile devices — Part 1: Generic system architectures of mobile eID systems*

ISO/IEC TS 23220-2, *Cards and security devices for personal identification — Building blocks for identity management via mobile devices — Part 2: Data objects and encoding rules for generic eID systems*

BSI TR-03111, *Elliptic Curve Cryptography (ECC)*

NIST SP 800-38D, *Recommendation for Block Cipher Modes of Operation: Galois/Counter Mode (GCM) and GMAC*

RFC 4122:2005, *A Universally Unique IDentifier (UUID) URN Namespace*

RFC 4395, *Guidelines and Registration Procedures for New URI Schemes*

RFC 4648, *The Base16, Base32, and Base64 Data Encodings*

RFC 5246, *The Transport Layer Security (TLS) Protocol Version 1.2*

RFC 5280:2008, *Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*

RFC 5869, *HMAC-based Extract-and-Expand Key Derivation Function (HKDF)*

RFC 6066:2011, *Transport Layer Security (TLS) Extensions: Extension Definitions*

RFC 7515:2015, *JSON Web Signature (JWS)*

RFC 7518, *JSON Web Algorithms (JWA)*

RFC 7519:2015, *JSON Web Token (JWT)*

RFC 8152, *CBOR Object Signing and Encryption (COSE)*

RFC 8259, *JavaScript Object Notation (JSON)*

RFC 8422:2018, *Elliptic Curve Cryptography (ECC) Cipher Suites for Transport Layer Security (TLS) Versions 1.2 and Earlier*

RFC 8446:2018, *The Transport Layer Security (TLS) Protocol Version 1.3*

RFC 8610:2019, *Concise Data Definition Language (CDDL)*

RFC 8949:2020, *Concise Binary Object Representation (CBOR)*

RFC 9052, *CBOR Object Signing and Encryption (COSE): Structures and Process*

RFC 9053:2022, *CBOR Object Signing and Encryption (COSE): Initial Algorithms*

RFC 9112:2022, *HTTP/1.1*

RFC 9360, *CBOR Object Signing and Encryption (COSE)*

Bluetooth SIG, *Bluetooth Core Specification, Version 5.2, December 2019*

NFC Forum, *CH 1.5, Connection handover technical specification*

Wi-Fi Alliance, *Neighbour awareness networking specification, Version 3.1*

Bibliography

- [1] ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country code*
- [2] ISO 3166-2, *Codes for the representation of names of countries and their subdivisions — Part 2: Country subdivision code*
- [3] ISO/IEC 14443-3:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 3: Initialization and anticollision*
- [4] ISO/IEC 24760-1, *Information security, cybersecurity and privacy protection — A framework for identity management — Part 1: Core concepts and terminology*
- [5] ISO/IEC TS 23220-5, *Cards and security devices for personal identification — Building blocks for identity management via mobile devices — Part 5: Trust models and confidence level assessment*
- [6] ISO/IEC 29115:2013, *Information technology — Security techniques — Entity authentication assurance framework*
- [7] RFC 761:1980, *DoD Standard Transmission Control Protocol (TCP)*
- [8] RFC 3986, *Uniform Resource Identifier (URI): Generic Syntax*, T. Berners-Lee et al, January 2005
- [9] RFC 5639, *Elliptic Curve Cryptography (ECC) Brainpool Standard Curves and Curve Generation*
- [10] RFC 6749, *The OAuth 2.0 Authorization Framework*, D. Hardt, October 2012
- [11] RFC 7231:2014, *Hypertext Transfer Protocol (HTTP/1.1)*
- [12] RFC 7516, *JSON Web Encryption (JWE)*
- [13] RFC 7591, *OAuth 2.0 Dynamic Client Registration Protocol*, J. Richer et al, July 2015
- [14] RFC 7517, *JSON Web Key (JWK)*, M. Jones, May 2015
- [15] RFC 7595, *Guidelines and Registration Procedures for URI Schemes*, D. Thaler et al, June 2015
- [16] RFC 8037, *CFRG Elliptic Curve Diffie-Hellman (ECDH) and Signatures in JSON Object Signing and Encryption (JOSE)*, I. Liusvaara, January 2017
- [17] RFC 8414, *OAuth 2.0 Authorization Server Metadata*, M. Jones, June 2018
- [18] RFC 9101:2021, *OAuth 2.0 Authorization Framework: JWT-Secured Authorization Request (JAR)*, Aug 2021
- [19] FIPS 140-2, *Security Requirements for Cryptographic Modules*
- [20] Bluetooth SIG, *Supplement to the Bluetooth Core Specification, Revision v9*, December 2019
- [21] NFC Forum, *Bluetooth Secure Simple Pairing Using NFC, Version 1.2*, May 2019
- [22] NFC Forum, *Data Exchange Format (NDEF) Technical Specification, Version 1.0*
- [23] NFC Forum, *Type 4 Tag Version 1.1*
- [24] ISO/IEC 18013-5, *Personal identification — ISO-compliant driving licence — Part 5: Mobile driving licence (mDL) application*