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Universal Serial Bus interfaces for data and power - Part 1-4: Common Components - USB Type-C Authentication Specification

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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English Version

Universal Serial Bus interfaces for data and power - Part 1-4: Common Components - USB Type-C(tm) Authentication Specification (IEC 62680-1-4:2018)

Interfaces de bus série universel (USB) pour les données et l'alimentation - Partie 1-4 : Composants communs - Spécification d'authentification USB Type-C(tm) (IEC 62680-1-4:2018)

Schnittstellen des Universellen Seriellen Busses für Daten und Energie - Teil 1-4: Gemeinsame Bauteile - Festlegung für USB-Typ-CTM-Authentifizierung (IEC 62680-1-4:2018)

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EN IEC 62680-1-4:2018 (E)

European foreword

The text of document 100/2981/CDV, future edition 1 of IEC 62680-1-4, prepared by technical area 14: "Interfaces and methods of measurement for personal computing equipment", of IEC/TC 100: "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62680-1-4:2018.

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IEC 62680-1-4

Edition 1.0 2018-04

INTERNATIONAL STANDARD

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Universal serial bus interfaces for data and power – Part 1-4: Common components – USB Type-C™ Authentication Specification

IEC 62680-1-4:2018-04(en)

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IEC 62680-1-4

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Universal serial bus interfaces for data and power – Part 1-4: Common components – USB Type-C™ Authentication Specification

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UNIVERSAL SERIAL BUS INTERFACES FOR DATA AND POWER –

Part 1-4: Common components – USB Type-C™ Authentication Specification

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The text of this International Standard is based on the following documents:

CDV	Report on voting
100/2981/CDV	100/3046/RVC

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A list of all parts in the IEC 62680 series, published under the general title *Universal serial bus interfaces for data and power*, can be found on the IEC website.

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The IEC 62680 series is based on a series of specifications that were originally developed by the USB Implementers Forum (USB-IF). These specifications were submitted to the IEC under the auspices of a special agreement between the IEC and the USB-IF.

This standard is the USB-IF publication USB Type-C™ Authentication Specification Revision 1.0.

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Universal Serial Bus Type-C™ Authentication Specification

Revision 1.0 with ECN and Errata through February 2, 2017

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Revision History

Revision	Date	Description
1.0	March 25, 2016	Initial Release
1.0 + ECN and Errata	February 2, 2017	Includes ECN and errata through February 2, 2017

1 Introduction

This specification provides a means for authenticating Products with regard to identification and configuration. Authentication is performed via USB Power Delivery message communications and/or via USB data bus control transactions.

USB Type-C™ Authentication allows an organization to set and enforce a Policy with regard to acceptable Products. This will permit useful security assurances in real world situations. For example:

- A vendor, concerned about product damage resulting from substandard charging devices, can set a Policy requiring that only certified PD Products be used for charging.
- A user, concerned about charging his phone at a public terminal, can set a Policy in his phone requiring that the phone only charge from certified PD Products.
- An organization, concerned about unidentifiable storage devices gaining access to corporate PC assets, can set a Policy in its PCs requiring that only USB storage devices that have been verified and signed by corporate IT are used.

1.1 Scope

This specification defines the architecture and methodology for unilateral Product Authentication. It is intended to be fully compatible with and extend existing PD and USB infrastructure. Information is provided to allow for Policy enforcement, but individual Policy decisions are not specified.

The Authentication of USB Type-C products that support Alternate Modes is allowed. However, the methods to do so are outside the scope of this specification.

1.2 Overview

This specification provides primitives for unilateral Authentication. The security model defined by this specification permits assurances that a Product is:

- Of a particular type from a particular manufacturer with particular characteristics
- Owned and controlled by a particular organization

Local Policy will determine which features need to be present in an attached Product before accessing or providing a resource (e.g. power, storage, etc.).

Product vendors can add security features beyond those listed in this specification, but the definition and implementation of those features is up to the vendor. Added features cannot alter the base specifications defined herein.

1.3 Related Documents

- ***USB2.0*** – Universal Serial Bus Specification, Revision 2.0, (including errata and ECNs through August 11, 2014) (referred to in this document as the USB 2.0 Specification) (available at: http://www.usb.org/developers/docs.)
- ***USB3.1*** – Universal Serial Bus 3.1 Specification, Revision 1.0, (including errata and ECNs through August 11, 2014) (referred to in this document as the USB 3.1 Specification) (available at: http://www.usb.org/developers/docs.)
- ***USBPD*** – Universal Serial Bus Power Delivery Specification, Revision 3, Version 1.0a, March 25, 2016 (referred to in this document as the USB PD Specification) (available at: http://www.usb.org/developers/docs.)
- ***USBTYPEC*** –Universal Serial Bus Type-C Cable and Connector Specification, Revision 1.2, March 25, 2016 (referred to in this document as the USB Type-C Specification)(available at: http://www.usb.org/developers/docs.)
- ***USBTYPEC BRIDGE*** Universal Serial Bus Type-C Bridge Specification, Revision 1.0, March 25, 2016, (available at http://www.usb.org/developers/docs.)
- ***ASN.1*** - ISO-822-1-4;
    - ITU-T X.680 (available at: https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-X.680-201508-I!!PDF-E&type=items);
    - ITU-T X.681 (available at: https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-X.681-201508-I!!PDF-E&type=items);
    - ITU-T X.682 (Available at: https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-X.682-201508-I!!PDF-E&type=items);
    - ITU-T X.683 (Available at: https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-X.683-201508-I!!PDF-E&type=items.)
- ***DER*** - ISO-8825-1; ITU-T X.690 (available at: https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-X.690-201508-I!!PDF-E&type=items.)
- ***X509v3*** - ISO-9594-8; ITU-T X.509 (available at: https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-X.509-201210-I!!PDF-E&type=items.)
- ***Common Criteria***:
    - Common Criteria for Information Technology Security Evaluation, Parts 1-3, Version 3.1, Revision 4, September 2010 (available at: https://www.commoncriteriaportal.org/cc/#supporting)
    - ISO/IEC 15408 Evaluation criteria for IT security Parts 1-3
- ***ECDSA***:
    - ANSI X9.62; NIST-FIPS-186-4, Section 6 (available at:

      http://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.186-4.pdf.)
    - ISO/IEC 14888-3 Digital signatures with appendix -- Part 3: Discrete logarithm based mechanisms (Clause 6.6)
- ***NIST P256, secp256r1***:
    - Certicom-SEC-2 (available at: http://www.secg.org/sec2-v2.pdf); NIST-Recommended-EC (available at:

      http://csrc.nist.gov/groups/ST/toolkit/documents/dss/NISTReCur.pdf.)

- ISO/IEC 15946 Cryptographic techniques based on elliptic curves (NIST P-256 is included as example)
  - *Notes: ISO/IEC 15946 series treat elliptic curves differently from FIPS 186-4. ISO/IEC 15946-5 is about elliptic curve generation. That is, based on the method in part 5, each application and implementation can generate its own curves to use. In other words, no ISO/IEC recommended curves. P-256 is consider an example in ISO/IEC 15946. Note that Elliptic Curve signatures and key establishment schemes have been moved to ISO/IEC 14888 and ISO/IEC 11770 respectively together with other discrete log based mechanisms. Test vectors (examples) use P-256 are included for each parts for those mechanisms.*

- ***SHA256***:
  - NIST-FIPS-180-4 (available at:

    http://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.180-4.pdf.)
  - ISO/IEC 10118-3 Hash-functions -- Part 3: Dedicated hash-functions (Clause 10)
- ***OID*** - ITU-T X.402 (available at: https://www.itu.int/rec/T-REC-X.402-199906-I/en.)
- ***SP800-90A***:
  - NIST-SP-800-90A (available at:

    http://csrc.nist.gov/publications/nistpubs/800-90A/SP800-90A.pdf.)
    - *Note: NIST-SP-800-90A was withdrawn June 2015 and replaced by NIST-SP-800-90A Revision 1 http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-90Ar1.pdf*
- ***SP800-90B*** – NIST-SP-800-90B (available at: http://csrc.nist.gov/publications/drafts/800-90/sp800-90b_second_draft.pdf.)[1]

[1] *Note that this document is still in DRAFT phase*.

[2] *Unless specified otherwise, all standards specified, including those from ISO, ITU, and NIST, refer to the version or edition which is more recent, as of 1 January 2016*.

1.4 Terms and Abbreviations

This section defines the terms and abbreviations used throughout this document.

Table 1-1: Terms and Abbreviations

Term/Abbreviation	Definition
ACD	Additional Certificate Data for a Product.
Authentication	The process of determining whether an Entity is in fact who or what it claims to be.
Authentication Initiator	Refers to a Product that initiates Authentication.
Authentication Responder	Refers to a Product with whom an Authentication Initiator is attempting to authenticate.
Certificate (Cert)	A digital form of identification that provides information about an Entity and certifies ownership of a particular public key.
Certificate Authority (CA)	An Entity that issues Certificates.
Certificate Chain	A series of two or more Certificates where each Certificate is signed by the preceding Certificate in the chain.
Entity	Refers to a Product or an organization, vendor, or manufacturer associated with such Products.
Evaluation Assurance Level (EAL)	The numerical rating describing the depth and rigor of a security evaluation.
Intermediate Certificate	A Certificate that is neither Root nor Leaf.
Leaf Certificate	The last Certificate in a Certificate Chain.
LSB	Least Significant Byte
MSB	Most Significant Byte
Nonce	A number used only once in any given key context. Can be interpreted as N-Once.
OID	Object Identifier. See ***OID*** for more details.
PD	USB Power Delivery
PD Product	Source, Sink, or Cable as defined in ***USBPD***
PDUSB Product	A USB Host or USB Device that is capable of both PD and USB communication.
Policy	Policy defines the behavior of Products. It defines the capabilities a Product advertises, its Authentication requirements, and resource availability with respect to unauthenticated Products.
Product	Refers to a PD Product, USB Product, and/or PDUSB Product.
Pseudorandom Number Generator (PRNG)	A deterministic algorithm for generating a number or sequence of numbers that are computationally indistinguishable from truly random. See ***SP800-90A*** for more details.
Root Certificate	The first Certificate in a Certificate Chain. This certificate is self-signed.
TLV	Type, Length, Value
USB Device	A Device (including a Hub) as defined in ***USB2.0*** and ***USB3.1***.
USB Host	A Host as defined in ***USB2.0*** and ***USB3.1***.

Term/Abbreviation	Definition
USB Hub	A Hub as defined in ***USB2.0*** and ***USB3.1***.
USB Product	A USB Host or USB Device.

1.5 Conventions

1.5.1 Precedence

If there is a conflict between text, figures, and tables, the precedence shall be tables, figures, and then text.

1.5.2 Keywords

The following keywords differentiate between the levels of requirements and options.

1.5.2.1 Conditional Normative

Conditional Normative is a keyword used to indicate a feature that is mandatory when another related feature has been implemented. Designers are mandated to implement all such requirements, when the dependent features have been implemented, to ensure interoperability with other compliant Products.

1.5.2.2 Deprecated

Deprecated is a keyword used to indicate a feature, supported in previous releases of the specification, which is no longer supported.

1.5.2.3 Informative

Informative is a keyword that describes information with this specification that intends to discuss and clarify requirements and features as opposed to mandating them.

1.5.2.4 May

May is a keyword that indicates a choice with no implied preference.

1.5.2.5 N/A

N/A is a keyword that indicates that a field or value is not applicable and has no defined value and shall not be checked or used by the recipient.

1.5.2.6 Normative

Normative is a keyword that describes features that are mandated by this specification.

1.5.2.7 Optional/Optionally/Optional Normative

Optional, ***Optionally***, and ***Optional Normative*** are equivalent keywords that describe features not mandated by this specification. However, if an ***Optional*** feature is implemented, the feature shall be implemented as defined by this specification.

1.5.2.8 Reserved

Reserved is a keyword indicating reserved bits, bytes, words, fields, and code values that are set-aside for future standardization. Their use and interpretation may be specified by future extensions to this specification and, unless otherwise stated, shall not be utilized or adapted by vendor implementation. A ***Reserved*** bit, byte, word, or field shall be set to zero by the sender and shall be ignored by the receiver. ***Reserved*** field values shall not be sent by the sender and, if received, shall be ignored by the receiver.

1.5.2.9 Shall/Normative

Shall and ***Normative*** are keywords indicating a mandatory requirement. Designers are mandated to implement all such requirements to ensure interoperability with other compliant Products.

1.5.2.10 Should

Should is a keyword indicating flexibility of choice with a preferred alternative. Equivalent to the phrase “it is recommended that”.

1.5.3 Numbering

Numbers that are immediately followed by a lowercase “b” (e.g., 01b) are binary values. Numbers that are immediately followed by a lowercase “h” (e.g., 3Ah) are hexadecimal values. Numbers not immediately followed by either a “b”, or “h” are decimal values.

1.5.4 Byte Ordering

Unless otherwise specified, all multiple byte values in this specification are interpreted as and moved over the bus in little-endian order, i.e., LSB to MSB.

The order by which individual bits are moved over a bus is defined in ***USBPD*** for PD Products and ***USB2.0*** and ***USB3.1*** for USB Products.