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Information technology — Biometric data interchange formats —

Part 4: Finger image data

AMENDMENT 1: Conformance testing methodology and clarification of defects

Technologies de l'information — Formats d'échange de données biométriques —

Partie 4: Données d'image du doigt

AMENDEMENT 1: Méthodologie d'essai de conformité et précisions concernant les défauts

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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.

Amendment 1 to ISO/IEC 19794-4:2011 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

Information technology — Biometric data interchange formats —

Part 4:
Finger image data

AMENDMENT 1: Conformance testing methodology and clarification of defects

1. *The following text is to be added to the "Introduction" clause of ISO/IEC 19794-4:*

   Annex A addresses conformance testing to this part of ISO/IEC 19794. Annex A is distinct from ISO/IEC 29109-4, which addresses conformance testing to ISO/IEC 19794-4:2005.

2. *The following text is to be added to the "Scope" clause of ISO/IEC 19794-4:*

   This part of ISO/IEC 19794 also specifies elements of conformance testing methodology, test assertions, and test procedures as applicable to this part of ISO/IEC 19794. It establishes test assertions pertaining to the structure of the finger image data format (Type A Level 1 as defined in ISO/IEC 19794-1:2011 AMD 1), test assertions pertaining to internal consistency of the types of values that may be contained within each field (Type A Level 2 as defined in ISO/IEC 19794-1:2011 AMD 1), and semantic test assertions (Type A Level 3 as defined in ISO/IEC 19794-1:2011 AMD 1).

   The conformance testing methodology specified in this part of ISO/IEC 19794 does not establish:

   — tests of other characteristics of biometric products or other types of testing of biometric products (e.g. acceptance, performance, robustness, security),

   — tests of conformance of systems that do not produce data records conforming to the requirements of this part of ISO/IEC 19794.

3. *The following text is to be added to the "Conformance" clause of ISO/IEC 19794-4:*

   Biometric data interchange format conformance tests conform to this part of ISO/IEC 19794 if they satisfy all of the normative requirements set forth in clause 8. Specifically, they shall use the test methodology specified in Clauses A.1, A.2 and A.3 of ISO/IEC 19794-1:2011 AMD 1, and all Level 1, Level 2 and Level 3 tests shall use the assertions defined in Table A.2 of Clause A.3 of this part of ISO/IEC 19794 in conformity with the concept and rules set in 19794-1 Annex A[1].

   Implementations of this part of ISO/IEC 19794 tested according to the specified methodology shall be able to claim conformance only to those biometric data record (BDB) requirements specified in this part of ISO/IEC 19794 that are tested by the test methods established by this methodology.

   Implementations of this part of ISO/IEC 19794 do not necessarily need to conform to all possible aspects of this part of ISO/IEC 19794, but only to those requirements that are claimed to be supported by the

[1] Annex A is specified in ISO/IEC 19794-1:2011 Amendment 1.

implementation in an implementation conformance statement (ICS), filled out in accordance with Clause A.3 of ISO/IEC 19794-1:2011 AMD 1 and Table A.2 of Clause A.3 of this part of ISO/IEC 19794.

4. *In clause 8.3.1 of ISO/IEC 19794-4:2011, Table 2, row "Image compression algorithm", Replace "0 to 5" with "0 to 6".*

5. *Replace Annex A of ISO/IEC 19794-4:2011 with the following one:*

Annex A
(normative)

Conformance testing methodology

A.1 Introduction

This normative annex specifies elements of conformance testing methodology, test assertions, and test procedures as applicable to this part of biometric data interchange format standard. Specifically, it establishes

— test assertions of the structure of the finger image data format as specified in this Part of ISO/IEC 19794 (Type A Level 1 as defined in ISO/IEC 19794-1:2011 AMD 1),

— test asssertions of internal consistency by checking the types of values that maybe contained within each field (Type A Level 2 as defined in ISO/IEC 19794-1:2011 AMD 1),

— tests of semantic assertions (Type A Level 3 as defined in ISO/IEC 19794-1:2011 AMD 1).

This normative annex does not establish

— test assertions on other characteristics of biometric products (e.g. acceptance, performance, robustness, security),

— conformance test assertions on systems that do not produce finger image record as specified in this part of ISO/IEC 19794.

The conformance testing methodology specified in ISO/IEC 19794-1: 2011 AMD 1 shall apply. The content of the tables below is based on ISO/IEC 19794-1:2011, AMD 1 and shall only be used in the context of that conformance testing methodology.

A.2 Table of requirements

The normative requirements specified in this Part of ISO/IEC 19794 are listed in Table A.1. The supplier of the IUT should explain which optional components of the standard are supported and the testing laboratory shall note the results of the test.

Table A.1 — Data format requirements specified in this Part of ISO/IEC 19794

Requirement Identifier	Governing section	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
Finger image general header							
R-1.	8.1	Each record shall pertain to a single subject.	3C	O-1		N/A	N/A
R-2.	8.1	Each record shall contain at least one representation for each of one or more fingers, multiple fingers (single image records), or palms.	3C	O-1		N/A	N/A
R-3.	8.2.1	Information shall be included for each field within the header.	1	M			
R-4.	8.2.2 Table 1	The format identifier shall be recorded in four bytes.	1	M			

Requirement Identifier	Governing section	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R-5.	8.2.2 Table 1	The format identifier shall consist of three characters "FIR" (0x464952) followed by a zero byte as a NULL string terminator. Therefore, the format identifier shall be 0x46495200.	1	M		N/A	
R-6.	8.2.3 Table 1	The Version Number shall be recorded in four bytes.	1	M		N/A	
R-7.	8.2.3 Table 1	This version number shall consist of three ASCII numerals “020” (0x30323000) followed by zero byte as a NULL string terminator.	1	M		N/A	
R-8.	8.2.4 Table 1	The length (in bytes) of the entire image data record shall be recorded in four bytes. Valid values are 57 to (2^{32} -1)	2	M			
R-9.	8.2.4	This length of entire record shall be total length of the general record header and one or more representation records.	2	M			
R-10.	8.2.5 Table 1	The total number of finger image representations contained in the finger image data record shall be recorded in two bytes. Valid values are 1 to 672.	1,2	M			
R-11.	8.2.5	A minimum of one representation is required.	1	M			
R-12.	8.2.6 Table 1	The one-byte certification flag shall indicate whether each representation header includes a certification record. Valid values are 00_{Hex} and 01_{Hex}.	1	M			
R-13.	8.2.6	A value of 00_{Hex} shall indicate that none of the representations contains a certification record.	2	M			
R-14.	8.2.6	A value of 01_{Hex} shall indicate that all representations contain a certification record.	2	M			
R-15.	8.2.7 Table 1	The number of finger or palm images included in the record shall be recorded in one byte. Valid values are 1 to FF_{HEX}.	1	M			
Finger image representation header							
R-16.	8.3.1	A finger or palm representation header shall start each section of finger data providing information for that representation of a single finger image, multi-finger image or palm image.	3C	O-1		N/A	N/A
R-17.	8.3.1	For each such image there shall be one finger header record accompanying the representation of the image data.	2	M		N/A	
R-18.	8.3.1	The representaion header shall occupy a minimum of 41 bytes (assuming no certification blocks and no quality blocks are present). Otherwise, it shall be 42+ 5*num_quality_block+ 3*num_certification_block	2	M			
R-19.	8.3.1	The compressed or uncompressed image data for that image representation shall immediately follow the image representation header.	3C	O-1		N/A	N/A
R-20.	8.3.1	Subsequent image representations (including the image representation header) will be concatenated to the end of the previous image representation.	3C	O-1		N/A	N/A

Requirement Identifier	Governing section	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R-21.	8.3.2 Table 2	The four-byte representation length field shall contain the length in bytes of the finger representation including the representation header fields. The minimum length is 41.	2	M			
R-22.	8.3.3 Table 2	Capture date-time field shall indicate the date and time the representation was captured. This field is not intended to encode the time the record was instantiated.	3C	O-1			
R-23.	8.3.3 Table 2	Capture time field shall be encoded in accordance to the requirements given in Part 1 of this standard. Parts of the capture date and time that are unknown shall be filled with FF_{Hex}, or $FFFF_{Hex}$ for two-byte components and all subsequent components shall be unknown.	1	M			
R-24.	8.3.4 Table 4	The one-byte capture device technology ID shall contain the entry chosen from Table 4 to indicate the technology type used by the capture device. Valid values are 0 to 20.	1	M			
R-25.	8.3.5 Table 2	The capture device vendor ID shall be recorded in two bytes.	1	M			
R-26.	8.3.5 Table 2	The capture device vendor ID shall identify the biometric organisation that owns the product that created the biometric record (BDIR) and shall be registered with the IBIA or other approved registration authority. A value of all zeros shall indicate that the capture device vendor is unreported.	3B	M			
R-27.	8.3.6 Table 2	This capture device type ID shall be recorded in two bytes.	1	M			
R-28.	8.3.6 Table 2	This capture device type ID shall identify the product type that created the biometric record and shall be assigned by the registered biometric record product owner or other approved registration authority. A value of all zeros shall indicate that the capture device type is unreported.	3C	O-1			N/A
R-29.	8.3.7.1	The quality information of the overall finger image data shall be recorded in one or more five-byte blocks.	1	M			
R-30.	8.3.7.1	Each of these blocks shall pertain to a specific quality/vendor/algorithm evaluation.	2	M			
R-31.	8.3.7.2 Table 2	The first byte of the quality record is mandatory and shall contain the number of subsequent quality blocks. Valid values are 0 to 255.	2	M			
R-32.	8.3.7.2 Table 2	Subsequent 5-byte blocks shall contain the specific quality/vendor/algorithm information for each quality/vendor/algorithm evaluation.	1,3B	M			
R-33.	8.3.7.2 Table 2	A value of zero (0) means that no attempt was made to assign a quality score. In this case, no Quality Blocks are present.	2	M			
R-34.	8.3.7.3 Table 2	The quality score shall be recorded in the first byte of each of the five-byte quality blocks. Valid values for quality score are integers between 0 and 100, and 255.	1	M			

Requirement Identifier	Governing section	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R-35.	8.3.7.3 Table 2	The quality score shall be the quantitative expression of the predicted verification performance of the biometric sample, per ISO/IEC 29794-1. For valid values 0 to 100, higher values shall indicate better quality.	3C	O-1			N/A
R-36.	8.3.7.3 Table 2	An entry of “255” shall indicate a failed attempt to calculate a quality score.	3C	O-1			N/A
R-37.	8.3.7.4 Table 2	The provider of quality scores shall be uniquely identified by bytes 2 and 3 of the 5-byte quality block.	1	M			
R-38.	8.3.7.4 Table 2	This Vendor ID shall be registered with the International Biometrics Industry Association (IBIA).	3B	M			
R-39.	8.3.7.5 Table 2	Bytes 4 and 5 of the 5-byte quality block shall specify an integer product code assigned by the vendor of the Quality Algorithm ID. It indicates which of the vendor’s algorithms (and version) was used in the calculation of the quality score and shall be within the range of 0 to 65535.	1	M			
R-40.	8.3.7.5 Table 2	Multiple quality scores calculated by the same algorithm (same vendor ID and algorithm ID) shall not be present in a single representation.	2	M			
R-41.	8.3.8.1 Table 2	The certification record shall consist of a length field followed by zero or more 3-byte certification blocks. Each certification block shall consist of a certification authority identifier and a certification scheme identifier.	2	M			
R-42.	8.3.8.1 Table 2	If the certification block flag in the general header has a value of 00_{Hex}, no capture device certification information shall be present in any of the representation header records for that finger image record.	2	M			
R-43.	8.3.8.2 Table 2	The first byte of the certification record is mandatory and shall contain the number of 3-byte certification blocks for the capture device. Valid values are 0 to 255.	1,2	M			
R-44.	8.3.8.3	The first two bytes of each 3-byte certification block shall contain the certification authority identifier agency or organization that certified the device according to a particular capture device quality specification.	1	M			
R-45.	8.3.8.3	The Certification Authority Identifier shall be registered by the IBIA or other approved registration authority.	3C	O-1			N/A
R-46.	8.3.8.4 Table 5	The 3rd and last byte of certification block shall identify a certification scheme identifier used to certify the capture device as listed in Table 5.	1	M			
R-47.	8.3.9 Table 2 Tables 6-8	The one-byte finger or palm position field shall contain the finger or palm position code. Valid values are 0-10, 13-15, 20-36, and 40-50.	1	M			
R-48.	8.3.10 Table 2	The one-byte representation number shall contain the specific image representation number associated with the image data (or finger, multi finger or palm image data).	2	M			

Requirement Identifier	Governing section	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R-49.	8.3.11 Table 2	Scale units field shall specify the units used to describe the scanning and image spatial sampling rate of the image.	3C	O-1			
R-50.	8.3.11 Table 2	Valid values (for scale units) are 01_{Hex} (indicating pixels per inch), or 02_{Hex} (indicating pixels per centimetre).	1	M			
R-51.	8.3.12 Table 2	The two-byte capture device spatial sampling rate (horizontal) shall specify the rounded scanning spatial sampling rate used in the horizontal direction.	3C	O-1			
R-52.	8.3.13 Table 2	The two-byte capture device spatial sampling rate (vertical) shall specify the rounded spatial sampling rate used in the vertical direction.	3C	O-1			
R-53.	8.3.14 Table 2	The two-byte image spatial sampling rate (horizontal) shall specify the rounded image spatial sampling rate used in the horizontal direction. Valid values are values smaller or equal to device spatial sampling rate (horizontal).	2	M			
R-54.	8.3.15 Table 2	The two-byte image spatial sampling rate (vertical) shall specify the rounded image spatial sampling rate used in the vertical direction. Valid values are values smaller or equal to device spatial sampling rate (vertical).	2	M			
R-55.	8.3.16 Table 2	The one-byte bit-depth field shall contain the number of bits used to represent a pixel. This field shall contain an entry of 01_{Hex}(=1) to 10_{Hex}(=16).	1	M			
R-56.	8.3.17 Table 9	The one-byte image compression algorithm field shall specify the method used to record the uncompressed or compressed grayscale images. Valid values are 0 to 6 as listed in Table 9.	1,2	M			
R-57.	8.3.17 Table 9	If compression algorithm code is 0, for grayscale pixels greater than eight bits, each pixel shall be recorded in a pair of bytes right justified.	3C	O-1			
R-58.	8.3.17 Table 9	When the compression algorithm code is 2, a certified version of the Wavelet Scalar Quantization (WSQ) algorithm as described in Annex E shall be used.	3C	O-1			
R-59.	8.3.17 Table 9	WSQ compression for 8-bit, 197 ppcm (500 ppi) grayscale images.shall be limited to a 15:1 compression ratio.	2	M			
R-60.	8.3.17	WSQ shall not be used to compress images scanned at 394 ppcm (1000 ppi).	2	M			
R-61.	8.3.17	JPEG shall not be used for new applications.	2	M			
R-62.	8.3.17	Fingerprint/palm print images scanned at 394 ppcm (1000 ppi), if compressed, shall be compressed using the JPEG 2000 algorithm as described in the ISO Standard 15444.	2	M			
R-63.	8.3.17	When JPEG 2000 is used, the JPEG 2000 profile settings as specified in the "Profile for 1000ppi Fingerprint Compression" normative reference are required to be incorporated.	3C	O-1			N/A
R-64.	8.3.17	If compression algorithm is 5, the ISO/IEC 15948 PNG algorithm shall be used.	2	M			