INTERNATIONAL STANDARD

ISO/IEC 17839-2

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AMENDMENT 1
2021-05

Information technology — Biometric System-on-Card —

Part 2: Physical characteristics

AMENDMENT 1: Additional specifications for fingerprint biometric capture devices

Technologies de l'information — Système biométrique sur carte —

Partie 2: Caractéristiques physiques

AMENDEMENT 1: Spécifications supplémentaires pour les capteurs d'empreintes digitales

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Part 2:
Physical characteristics

AMENDMENT 1: Additional specifications for fingerprint biometric capture devices

Clause 2

Add the following sentence at the end of the clause:

A Biometric System-on-Card using an area fingerprint biometric capture device claiming compliance to this document, shall express the class defined in Table 1 in the compliance statement, e.g. ISO/IEC 17839-2 Class C.

Clause 4

Replace the text with the following:

For the purposes of this document, the terms and definitions given in ISO/IEC 18328-2:2015, Annex A, ISO/IEC 17839-1, ISO/IEC 7810, ISO/IEC 2382-37 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

Add new terminological entries as follows:

4.1
minutiae-based comparison algorithm
fingerprint biometric features comparison algorithm, which relies on evaluating fingerprint minutiae data, e.g. in the format defined in ISO/IEC 19794-2 or ISO/IEC 39794-2[1)]

4.2
hybrid comparison algorithm
fingerprint biometric comparison algorithm, which relies on evaluating fingerprint minutiae data (e.g. in the format defined in ISO/IEC 19794-2 or ISO/IEC 39794-2) and extended feature data, such as, for example, ridge count data, curvature, delta and core singular points or any other proprietary vendor-specific data

1) Under preparation. (Stage at the time of publication: ISO/IEC CD 39794-2:2021.)

4.3
pattern comparison algorithm
pattern correlation algorithm
fingerprint biometric sample and/or biometric features comparison algorithm, which focuses on biometric sample image level correlation, typically trying to find a small fraction of a probe fingerprint image in a larger reference image or in a plurality of reference images obtained during *multi-touch enrolment* (4.6) process

Note 1 to entry: The data structures used in a pattern matcher are usually proprietary. A pattern comparison algorithm can evaluate lower level 3 fingerprint features a.k.a. "micro-features" such as, for example, sweat pores, incipient ridges or ridge shape.

4.4
image stitching algorithm
algorithm assembling multiple captured biometric samples of the fingerprint into a larger reference biometric "super-sample" image (as if it was captured using large scan area sensor) using *pattern correlation algorithm* (4.3), which can be subject to intellectual property rights

4.5
template stitching algorithm
algorithm assembling biometric feature reference templates (e.g. ISO/IEC 19794-2 or ISO/IEC 39794-2 minutiae data) extracted from multiple captured biometric samples of the fingerprint into a larger reference biometric "super-template" (as if it was extracted from biometric sample captured using large scan area sensor) using *minutiae comparison algorithm* (4.1) or *hybrid comparison algorithm* (4.2)

4.6
multi-touch enrolment
process of acquiring multiple captures biometric samples during biometric reference data enrolment phase

Note 1 to entry: Multiple reference data biometric samples (images) or reference templates can be stored, or combined into one larger reference data "super-sample" or "super-template" using *image stitching algorithm* (4.4) or *template stitching algorithm* (4.5), respectively.

Note 2 to entry: Multi-touch enrolment is common in many smartphones with a small fingerprint sensor.

4.7
enrolment update
process of merging the current biometric probe's biometric sample data or biometric feature data into biometric reference (e.g. enrolled using *multi-touch enrolment* (4.6))

Note 1 to entry: In a BSoC context, enrolment update can happen after card issuance to update biometric reference data that can be stored in a secure element. Enrolment update helps, when using features that are not time constant over a longer period of time or are capture environment dependent.

6.3.1

Replace the content with the following:

> The industry provides two different categories of biometric capture devices with respect to shape. Area fingerprint sensors are operated by touching the sensor with a finger. Swipe fingerprint sensors require the user to move his or her finger over the biometric capture device. In the case of a swipe sensor, the effective area of fingerprint capture is bigger than the sensor size.

NOTE 1 The rolled impressions acquired using a rolling motion over the scanning area are not being considered for area shape scanners within this document due to lack of usability and applicability for BSoC use case. Only plain (flat) live-scan fingerprints being acquired via scan area touch without any rolling motion considered for area type finger sensors defined within this document for BSoC.

The size of the capture area and the resolution of a fingerprint biometric capture device have an influence on the biometric performance of the Biometric System-on-Card.

Area fingerprint sensors shall conform to one of the classes from Table 1.

Table 1 — Classification of BSoC area fingerprint sensors

Class	Minimum capture area	Minimum native resolution
A	No restriction	No restriction
B	64 mm^2	No restriction
C	169 mm^2	320 ppi
D	210 mm^2	500 ppi

NOTE 2 Class D is defined based on a FAP 10 fingerprint acquisition profile as specified in ANSI/NIST-ITL 1-2011 Update:2015[7] special publication. Class C definition is inspired by the recent evaluation studies in References [8], [9] and [10]. Class B is based on industry feedback. See Annex A for rationale behind the classes in Table 1.

Swipe fingerprint sensors shall have a minimum width of 13 mm (0,512 in).

Annex A

Add new Annex A as follows:

Annex A
(informative)

Rationale for introducing classes of sensors in a BSoC

A.1 General

This annex serves as a guideline on best usage of the different classes defined in Table 1.

A.2 Background for defining classes in Table 1

Class D sensor characteristics are a subset of requirements typical for government applications, such as national ID, border control, law enforcement and healthcare. Sensors complying to this requirement typically allow a high level of biometric performance and tolerance against varying environmental conditions.

Class C sensors have a proven biometric performance meeting market requirements based on interoperable minutiae-based comparison algorithms and hybrid comparison algorithms with independent third party tests on plausible size private data sets (see References [8], [9] and [10] for details).

Class B sensor may be substantially smaller than an adult subject fingerprint. It can happen that two distinct captured biometric samples (images) from the same subject captured using Class B sensor have low common overlap area. In this case, it is more difficult to perform a positive biometric comparison. Therefore, Class B and smaller sensor should use multi-touch enrolment. Class B BSoC may require a combination of a proprietary pattern comparison algorithm and regular enrolment updates to operate reliably.

Class A sensors point to a potential future technology, that may allow identifying individuals with sensors having even smaller capture area or resolution than Class B.

Bibliography

Add new Bibliography at the end of the document as follows:

Bibliography

[1] ISO/IEC 39794-2, *Information technology — Extensible biometric data interchange formats — Part 4: Finger minutiae data*

[2] ISO/IEC 2382-37, *Information technology — Vocabulary — Part 37: Biometrics*

[3] ISO/IEC 7810, *Identification cards — Physical characteristics*

[4] ISO/IEC 17839-1, *Information technology — Biometric System-on-Card — Part 1: Core requirements*

[5] ISO/IEC 18328-2:2015, *Identification cards — ICC-managed devices — Part 2: Physical characteristics and test methods for cards with devices*

[6] ISO/IEC 19794-2:2011, *Information technology — Biometric data interchange formats — Part 2: Finger minutiae data*

[7] ANSI/NIST-ITL 1-2011 Update: 2015, *Information Technology: American National Standard for Information Systems - Data Format for the Interchange of Fingerprint, Facial& Other Biometric Information.*

[8] B. Fernandez-Saavedra, R. Sanchez-Reillo. "Public Report on an Evaluation of 3 fingerprint sensors and 2 algorithms". May 11, 2015.

[9] R. Sanchez-Reillo. "Public Report on an Evaluation (Madrid-2) of 5 fingerprint sensors and 1 algorithm". October 22, 2018.

[10] Fernandez-Saavedra, Belen; Sanchez-Reillo, Raul; Ros-Gomez, Rodrigo; Liu-Jimenez, Judith: 'Small fingerprint scanners used in mobile devices: the impact on biometric performance', IET Biometrics, 2016, 5, (1), p. 28-36, DOI: 10.1049/iet-bmt.2015.0018.