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AMENDMENT 1
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Information technology — Biometric data interchange formats —

Part 1: **Framework**

AMENDMENT 1: Conformance testing methodology

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

Partie 1: Cadre

AMENDEMENT 1: Méthodologie d'essai de conformité

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Foreword

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

Information technology — Biometric data interchange formats —

Part 1: Framework

AMENDMENT 1: Conformance testing methodology

Page vi, Introduction

Add the following paragraphs after Figure 1:

Users of biometric systems desire to use this and other standards to ensure that components of the biometric system can be substituted with other components from different vendors with a minimum of effort, and also to ensure that biometric data produced by one system can be used by another system. In order to achieve this, it is critical that systems claimed to conform to a standard actually are conformant, and thus there is a need for a standardized conformance testing methodology for each of the biometric data interchange formats described in ISO/IEC 19794, in order to provide a reasonable degree of assurance that a conformance claim has validity. While conformance of individual elements of data interchange records to relevant requirements can be determined, no test can be absolutely comprehensive and prove that a given system generating or using biometric data interchange records is conformant under all possible circumstances, especially when there are optional components of the standard. A well designed conformance test can, however, test all of the most likely sources of problems and ensure that the implementation under test conforms under a reasonable set of circumstances, giving assurance, but not a guarantee, of conformance.

There are many different types of conformance testing that may be appropriate for the various parts of ISO/IEC 19794. Some of these tests are highly specific to each data interchange format but some of them have many common elements across all of the formats. This part of ISO/IEC 19794 also describes the different types of conformance testing, and provides details of the common elements for defining test assertions. It also provides guidelines for conducting the tests and reporting the results of the tests. Tests and assertions common for most or all biometric data interchange formats (e.g., for common elements of the general headers and the common elements of the representation headers) are specified in this part of ISO/IEC 19794; the specific tests and assertions for each biometric data interchange format are left to the subsequent parts of ISO/IEC 19794.

Annex A of this part of ISO/IEC 19794 is distinct from the ISO/IEC 29109-1 which addressed conformance testing only of the first edition of ISO/IEC 19794. The normative Annex A of this part of ISO/IEC 19794 addresses conformance testing of data formats specified in the second edition of ISO/IEC 19794.

Page 1, Scope

Add the following text at the end of the Scope:

This part of ISO/IEC 19794 also specifies the concepts, test types and conformance testing methodologies to test biometric data interchange records or computer algorithms that create biometric data interchange records. It defines two types (type A, i.e., biometric data interchange records and systems generating such records; and type B, i.e., systems using biometric data interchange records), and three levels (Level1, i.e., checking internal content of each field; Level 2, i.e., checking internal consistency of the entire record; and Level 3, i.e., checking whether the data record is a faithful

representation of the original biometric data) of conformance testing, but it only provides a detailed description and methodology for the three levels of Type A testing. This part of ISO/IEC 19794 specifies test requirements, assertions, and test execution and reporting procedures that are common for most or all biometric data interchange formats. It explicitly does not cover the following areas:

- Modality-specific detailed test elements and assertions or descriptions of any mandatory standard datasets required for testing. They are provided in the subsequent parts of ISO/IEC 19794.
- Testing whether implementations under test (IUTs) that claim to be able to use conformant biometric data interchange records are able to correctly process such biometric data interchange records (Type B testing).
- Conformance testing of CBEFF requirements
- Testing of other characteristics of biometric products or other types of testing of biometric products (i.e., acceptance, performance, robustness, security).

Page 1

Add the following clause after the Scope and renumber all subsequent clauses accordingly:

2 Conformance

Biometric data interchange format conformance tests that claim conformance to this part of ISO/IEC 19794 shall satisfy the normative requirements of the methodology for those levels of test they are claiming to perform, as described in Clauses A.1, A.2 and A.3. Any conformance tests shall use the assertion types defined in Clause A.2 with the specific assertion details given in this and the relevant subsequent parts of this standard.

Implementations of subsequent parts of ISO/IEC 19794 tested according to the methodology specified in this part of ISO/IEC 19794 shall be able to claim conformance only to those requirements specified in ISO/IEC 19794 that are tested by the test methods established by this methodology.

Pages 1 to 8, Terms and definitions

Add the following terms and definitions alphabetically , renumbering accordingly:

4.x
assertion
specification for testing a conformance requirement in an implementation under test expressed in a formal assertion definition language

4.x
assertion test
specification of software or procedural methods that generate the test outcomes used for assessment of conformance to an assertion

NOTE This is adapted from the definition of “assertion test” in ISO/IEC 13210:1999.

4.x
attestation
issue of a statement, based on a decision that fulfillment of specified requirements has been demonstrated

NOTE This is adapted from the definition of “attestation” in ISO/IEC 17000:2004.

4.x
certification
third-party attestation related to products

[ISO/IEC 17000:2004]

4.x
conformance
conformity
fulfillment by a product, process, or service of all relevant specified conformance requirements

NOTE For all practical purposes, data records are considered to be a type of a “product”, i.e., provisions of this standard that are applicable to “products” apply to data records.

4.x
conformance requirement
requirement stated in a data format specification and defined in a finite, measurable, and unambiguous manner

NOTE This is adapted from the definition of “conformance requirement” in ISO/IEC 13210:1999.

4.x
conformance test
specified technical procedure of conformance testing

4.x
conformance testing
testing
determination of one or more characteristics of an object of conformity assessment, according to a procedure

[ISO/IEC 17000:2004]

4.x
conformance testing laboratory
organization that carries out conformance testing.

EXAMPLE This may be the creator of the IUT, the user of the IUT, or an unbiased third party.

4.x
conformance test specification
test specification
provisions of ISO/IEC 19794 biometric data interchange format standard that is concerned with test methods, sometimes supplemented with other provisions related to testing, such as sampling, use of statistical methods, and sequence of tests

NOTE This is adapted from the definition of “testing standard” in ISO/IEC GUIDE 2:2004.

4.x
conformance testing suite
CTS
test software used to automate certain types of conformance testing

4.x
conformity assessment
demonstration that specified requirements relating to a product, process, system, person or body are fulfilled

[ISO/IEC 17000:2004]

4.x
data format specification
provisions of ISO/IEC 19794 biometric data interchange format standard containing the specification that is the subject of the conformance testing

4.x
declaration
declaration of conformity
first-party attestation

[ISO/IEC 17000:2004]

4.x
Implementation conformance statement
ICS
statement by the supplier of an implementation under test that indicates which mandatory and optional components of the data format specification are supported by the implementation

4.x
implementation under test
IUT
that which implements the data format specification being tested

NOTE Depending on the conformance requirements of the data format specification, this may simply be a set of biometric data interchange records or it may be a computer algorithm in the form that creates the BDIR and/or uses the data contained in the BDIR.

4.x
input biometric data record
IBDR
data package containing a less processed form of biometric data which is suitable for use in the creation of a BDIR

NOTE In some cases, this may be an image, but it may also be raw sensor output such as a time series of data points from a digitization tablet.

4.x
level 1 testing
conformance testing methodology that checks field by field and byte by byte conformance with the specification of the BDIR as specified in the data format specification, both in terms of fields included and the ranges of the values in those fields

NOTE This type of testing tests syntactic requirements of the data format specification.

4.x
level 2 testing
conformance testing methodology that tests the internal consistency of the BDIR under test, relating values from one part or field of the BDIR to values from other parts or fields of the BDIR

NOTE This type of testing tests syntactic requirements of the data format specification.

4.x
level 3 testing
conformance testing methodology that tests that a BDIR produced by an IUT is a faithful representation of the IBDR subject to the constraints of the parameters in the metadata records

NOTE This type of testing tests semantic requirements of the data format specification.

4.x
metadata record
data record containing any specific parameters related to the data itself, particularly required by an IUT to transform an IBDR into a BDIR

EXAMPLE Type of image (basic, full frontal, token frontal or other) and the level of compression for a face image BDIR; the presence of core, delta, or ridgecounts in the extended area for finger minutiae BDIR; the size of each pattern in a finger pattern BDIR.

4.x
procedure
specified way to carry out an activity or a process

[ISO 9000:2005]

4.x
requirement
provision that conveys criteria to be fulfilled

[ISO/IEC GUIDE 2:2004]

4.x
test method
specified technical procedure for performing a test

NOTE This is adapted from the definition of "test method" in ISO/IEC GUIDE 2:1996. More recent edition of ISO/IEC GUIDE 2 or ISO/IEC 17000:2004 no longer contain this definition

4.x
test report
document that presents test results and other information relevant to the execution of the test methods against an Implementation Under Test

NOTE This is adapted from the definition of "test report" in ISO/IEC 13210:1999 and ISO/IEC GUIDE 2:1996.

4.x
Type A conformance claim
conformance claim that an IUT is a conformant BDIR, or can create conformant BDIRs from appropriate IBDRs

4.x
Type B conformance claim
conformance claim that an IUT can read conformant BDIRs, interpret them correctly, and perform its desired function upon them

Page 8, Abbrevaited terms

Add the following abbreviated terms alphabetically:

CTS Conformance Testing Suite

ICS Implementation Conformance Statement

IUT Implementation Under Test

IBDR Input Biometric Data Record

Page 14, 8.1 (now renumbered as 9.1)

In the last sentence, change "Annex A" to "Annex B".

Page 25, Annex A

Rename Annex A as Annex B.

Page 24

After Table 7, insert the following annex:

Annex A
(normative)
Conformance testing methodology

A.1 Conformance testing framework

A.1.1 Limitations

While conformance of individual elements of each data interchange record to relevant requirements can be determined, no conformance test of a given system generating or using biometric data interchange records can be complete or perfect. Ultimately, it is only possible to prove that an IUT is non-conformant. The goal of conformance testing is therefore to capture enough of the requirements of the data format specification and test them under enough conditions, that any IUT that passes the conformance test is likely to be conformant. Two problems with a data format specification that may only become apparent during conformance testing are that some areas may be undefined (so that the specification of these areas is left to each vendor) or ill-defined (so that there is a contradiction between parts of the data format specification or an easy misinterpretation caused by the wording of the data format specification). The latter problem may be resolved by an amendment to the standard, but the former problem may be difficult to resolve. An obvious example is the use of proprietary extended data blocks within a BDIR. There may be good reasons to allow such proprietary data, but very little conformance testing is possible while the data remains proprietary. Also, if the data format specification includes a requirement to interpret the BDIR or use it for biometric comparison, then it is difficult to be sure of the effect of a proprietary data block produced by one IUT when another IUT is attempting to interpret it.

A.1.2 Managing data records

Note that since CBEFF conformance testing is out of scope for this standard, it is generally assumed that the BDIRs will have been removed from any CBEFF data structures prior to beginning the conformance test. Typically, for Type A testing as described in Clause A.1.3, either the IUT will provide BDIRs without a CBEFF encapsulator or the CTS will remove them from such an encapsulator if one exists. Regardless of the method used, the test shall provide a means of passing the CBEFF format type corresponding to the IBDRs in the IUT or produced by the IUT to the CTS. This may be as simple as the supplier of the IUT sending a written instruction to the testing laboratory that all BDIRs produced by this IUT would have a particular format type, or it may involve the IUT passing a special parameter or using a specific CBEFF patron format that is not part of its normal function outside the test. The reason this is required is that several parts of ISO/IEC 19794 have different format types that determine whether or not certain optional data is present. Thus format type is an extra field that shall always be present together with a BDIR when conformance testing using that BDIR occurs.

A.1.3 Conformance testing types

Generally, the goal of biometric data interchange format conformance testing is to assure the users of conformant biometric products that a BDIR produced by any conformant product can be interpreted and used correctly by any other conformant product. There are thus two types of fundamental conformance claims. Type A is the ability to produce conformant BDIRs and Type B is the ability to use conformant BDIRs. Different IUTs may have different purposes for which they use a conformant BDIR, and thus Type B testing is more complex than Type A testing because it has to account for all of these purposes. ISO/IEC 19794 is focused on Type A testing exclusively. When biometric data interchange records themselves are tested in the absence of any software or hardware that produced them or uses them, this is treated as Type A testing.

A.1.4 Conformance testing levels

A.1.4.1 Hierarchy of Conformance Tests

A first step towards the goal of demonstrating conformance is ensuring that all of the specified fields and data structures in the BDIR are correct and self-consistent. This does not validate the fidelity of the information contained in the BDIR, however, since that depends on the relationship between the original IBDR and the BDIR. This leads to a natural hierarchy of conformance testing levels.

The conformance testing hierarchy presented in this standard has three levels. Generally they progress from least complex and expensive to test to most complex and expensive to test. They also progress from less useful in predicting the performance of real world systems using conformant products, to more useful, although even Level 1 conformance testing represents a significant step towards that goal. The types of assertions for Level 1 and Level 2 testing for all parts of ISO/IEC 19794 are similar and so a list of assertion operators and operands that should be used to define assertions is given in Clause A.2 of this part of ISO/IEC 19794. The details of all the Level 1 and Level 2 assertions for each data format specification are given in the appropriate subsequent parts of ISO/IEC 19794. For the more complex Level 3 testing, where the actual fidelity of the information in the BDIR is compared to that in the IBDR, the subsequent parts of ISO/IEC 19794 provide, as far as it is possible, guidance on how to carry out Level 3 testing for their specific data interchange formats. A given conformance test may therefore involve conformance testing at different levels.

It will ultimately be up to application profiles or to individual users of ISO/IEC 19794 to determine which level of conformance testing will be required for a specific application, as well as any requirements on performance or interoperability. This will be dependent on time, cost, and importance of biometric performance, implications of non-interoperability and the current state of the published versions of the various parts of ISO/IEC 19794.

A.1.4.2 Level 1 – Data format conformance

In Level 1 testing, a set of BDIRs shall be checked for field-by-field and byte-by-byte conformance with the specification of the data format specification, both in terms of fields included and the ranges of the values in those fields. The specific assertions tested for each data format specification shall be those described in the appropriate part of ISO/IEC 19794.

The advantage of this testing is that it does not require an IUT to be a computer algorithm or a set of hardware and software. It can simply be a set of BDIRs. Thus, any hardware or software components of the implementation being tested do not have to come into the possession of the testing lab, only BDIRs created with those components.

An IUT may have the capability to produce multiple BDIRs, depending on the requirements of the application in which it is used. Some of these BDIRs may be conformant and others may not, and so it is important to specify which types were tested and how many of each type. In an ideal world every possible combination of parameters for a particular biometric data interchange format would be tested, but this is not realistic given the resources that would be required for such testing. Provided a test reports the presence or absence of optional fields and the values for variable structural fields it is possible for a user of the data format specification to determine if the particular variant of the standard tested is appropriate for their needs. The user may also require conformance test results for a specific type of BDIR. An obvious example would be a two finger BDIR or two iris BDIR, since many applications require enrollment of more than one biometric characteristic in order to allow for a back-up if one of them becomes damaged or temporarily unusable. Some IUTs might be conformant with a single-representation BDIR, or even with multiple representations of a single finger or iris, but might fail conformance testing when the BDIR contains more than one finger or iris.

A.1.4.3 Level 2 – Internal consistency checking

In Level 2 testing, a set of BDIRs shall be checked to determine if they are internally consistent. The specific assertions tested for each data format specification shall be those described in the appropriate part of ISO/IEC 19794.

