INTERNATIONAL STANDARD

ISO/IEC 19785-1

First edition
2006-05-01

Information technology — Common Biometric Exchange Formats Framework —

Part 1:
Data element specification

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ISO/IEC 19785-1:2006
https://standards.iteh.ai/catalog/standards/sist/a36ba667-1fec-48ea-bf11-
725af9fe7b91/iso-iec-19785-1-2006

Contents

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.

ISO/IEC 19785-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

ISO/IEC 19785 consists of the following parts, under the general title *Information technology — Common Biometric Exchange Formats Framework*:

— *Part 1: Data element specification*

— *Part 2: Procedures for the operation of the Biometric Registration Authority*

— *Part 3: Patron format specifications*

ISO/IEC 19785 is the first International Standard on CBEFF. Previous versions were published by the National Institute of Standards and Technology (an agency of the government of the United States of America) and the Biometric Consortium Working Group. Since the last official non-ISO/IEC release was designated Version 1.1, the first version of ISO/IEC 19785-1 is designated Version 2.0. This is to distinguish the versions of CBEFF products in the marketplace.

Introduction

The *Common Biometric Exchange Formats Framework* (CBEFF) promotes interoperability of biometric-based applications and systems by specifying standard structures for *biometric information records* (BIRs) and a set of abstract data elements and values that can be used to create the header part of a CBEFF-compliant BIR.

A biometric information record (BIR) is an encoding in accordance with a CBEFF patron format (see below). It is a unit of biometric data for storage in a database or for interchange between systems or parts of systems. A BIR always has at least two parts: a standard biometric header (SBH) and at least one biometric data block (BDB). It may also have a third part called the security block (SB). CBEFF places no requirements on the content and encoding of a BDB except that its length shall be an integral number of octets; the several parts of ISO/IEC 19794 specify standardized BDB formats for a number of biometric types.

The primary purpose of CBEFF is to define *abstract data elements* (data elements with a set of defined abstract values, with their semantics) that are expected to be of general utility as parts of the SBH in biometric information records. This part of ISO/IEC 19785 defines these data elements.

A *CBEFF patron format* is defined for a particular domain of use. A CBEFF patron format is a full bit-level specification of encodings that can carry some or all of the abstract values of some or all of the CBEFF data elements defined in this part of ISO/IEC 19785 (possibly with additional abstract values determined by the CBEFF patron), together with one or more biometric data blocks (BDBs) containing biometric data. It is intended that there be a limited number of CBEFF patron formats in any given domain of use. However, new technologies may evolve that need new encoding rules (or support of more or different CBEFF data elements) and hence may require new CBEFF patron formats for a given domain of use.

CBEFF also has a requirement that a *Biometric Registration Authority* exist to assign unique identifiers to biometric organizations, to biometric data block (BDB) formats, to security block (SB) formats, and to CBEFF patron format specifications (see above); to publish them where appropriate; and to ensure that no conflicts occur between identifiers. ISO/IEC 19785-2 specifies the procedures under which the Biometric Registration Authority operates.

CBEFF introduces the concept of assigning a unique identifier to a *biometric organization*. A CBEFF biometric organization is any organization, public or private, that requests and receives a biometric organization identifier from the Biometric Registration Authority.

CBEFF also introduces the concept of a *CBEFF patron*. A CBEFF patron is an organization (registered as a biometric organization) that specifies, or intends to specify, one or more CBEFF patron formats in an open and public manner. Only public standards organizations such as a standards body, working group, or industry consortium, can register as CBEFF patrons (other CBEFF biometric organizations are not CBEFF patrons). A CBEFF patron obtains a biometric organization identifier from the Biometric Registration Authority, but has privileges beyond those of ordinary CBEFF biometric organizations: it can define, register and publish one or more CBEFF patron formats. The biometric organization identifier of a CBEFF patron can (but need not) be encoded in BIRs conforming to the patron formats defined by that CBEFF patron.

CBEFF also defines the concept of a CBEFF *biometric data block (BDB) format owner*. A CBEFF BDB format owner is an organization (registered as a CBEFF biometric organization) that specifies one or more BDB format specifications. A BDB format owner obtains a CBEFF biometric organization identifier from the Biometric Registration Authority. A BDB format owner can be a public standards organization (that would, coincidentally, also qualify as a CBEFF patron) or any organization that has a need to define its own vendor-specific BDB formats, whether they are to be published or not.

A CBEFF BDB format owner defines one or more BDB formats and assigns a *BDB format identifier* that unambiguously identifies that BDB format within those defined by the BDB format owner. A BDB format identifier (and the corresponding format) may, but need not, be registered with the Biometric Registration Authority.

CBEFF also defines the concept of a *CBEFF biometric product owner.* A CBEFF biometric product owner is an organization (registered as a CBEFF biometric organization) that assigns a biometric product identifier to a biometric product. A biometric product owner can be a public standards organization such as a standards body, working group, or industry consortium (such an organization would, coincidentally, also qualify as a CBEFF patron), or any organization, such as a vendor or integrator, that has a need to assign biometric product identifiers to biometric products. A biometric product owner can also, but need not, be a BDB format owner and vice versa.

A CBEFF biometric product owner assigns *biometric product identifiers* to one or more biometric products*.* The identified products can be hardware or software products or a combination of hardware and software. Examples of biometric products are *biometric service providers* (BSPs as defined by ISO/IEC 19784-1) and *biometric transforming applications.* A biometric product identifier unambiguously identifies a biometric product within those that have been assigned an identifier by the biometric product owner. A biometric product identifier may, but need not, be registered with the Biometric Registration Authority.

CBEFF also defines the concept of a *CBEFF security block (SB) format owner.* A CBEFF security block format owner is an organization (registered as a CBEFF biometric organization) that assigns a security block format identifier to a security block format. A CBEFF security block format owner can be a public standards organization such as a standards body, working group, or industry consortium (such an organization would, coincidentally, also qualify as a CBEFF patron), or any organization, such as a vendor or integrator, that has a need to assign security block format identifiers to security block formats. A security block format owner can also, but need not, be a BDB format owner and vice versa.

A CBEFF security block format owner assigns *security block format identifiers* to one or more security block formats*.* A security block format identifier unambiguously identifies a security block format within those that have been assigned an identifier by the biometric security block format owner. A security block format identifier may, but need not, be registered with the Biometric Registration Authority.

This part of ISO/IEC 19785 specifies a *simple CBEFF BIR structure* and a *complex CBEFF BIR structure*, and gives the requirements for the specification of a CBEFF patron format based on one or the other of these abstract data structures.

This part of ISO/IEC 19785 also specifies *transformations* of BIRs from one CBEFF patron format into a different CBEFF patron format.

Clause 2 specifies the conformance requirements for CBEFF patrons that define CBEFF patron formats. It also specifies the conformance requirements for biometric transforming applications and for implementations claiming conformance to a specific patron format.

Clause 6.5 specifies the CBEFF abstract data elements and the biometric transformation requirements for each data element.

Annex A is normative. It defines a patron format conformance statement that patrons are to complete and publish as part of their patron format specifications as assurance that the format fully complies with CBEFF requirements.

Information technology — Common Biometric Exchange Formats Framework —

Part 1:
Data element specification

1   Scope

1.1   This part of ISO/IEC 19785 defines structures and data elements for biometric information records (BIRs).

1.2   This part of ISO/IEC 19785 defines the concept of a domain of use to establish the applicability of a standard or specification that complies with CBEFF requirements.

1.3   This part of ISO/IEC 19785 defines the concept of a CBEFF patron format, which is a published BIR format specification that complies with CBEFF requirements, specified by a CBEFF patron.

1.4   This part of ISO/IEC 19785 defines the abstract values (and associated semantics) of a set of CBEFF data elements to be used in the definition of CBEFF patron formats.

1.5   This part of ISO/IEC 19785 specifies the use of CBEFF data elements by a CBEFF patron to define the content and encoding of a standard biometric header (SBH) to be included in a biometric information record (i.e. the definition of a CBEFF patron format).

1.6   This part of ISO/IEC 19785 provides the means for identification of the formats of the biometric data blocks (BDBs) in a BIR, but the standardization and interoperability of BDB formats is not in the scope of this part of ISO/IEC 19785. It also provides a means (the security block) for BIRs to carry information about the encryption of a BDB in the BIR and about integrity mechanisms applied to the BIR as a whole, but the structure and content of security blocks is the responsibility of CBEFF patrons and is not in the scope of this part of ISO/IEC 19785. Further, the specification of encryption mechanisms for BDBs and of integrity mechanisms for BIRs is not in the scope of this part of ISO/IEC 19785.

1.7   This part of ISO/IEC 19785 specifies transformations from one CBEFF patron format to a different CBEFF patron format.

1.8   The encoding of the abstract values of CBEFF data elements to be used in the specification of CBEFF patron formats is not in the scope of this part of ISO/IEC 19785.

1.9   ISO/IEC 19785-2 specifies the operation of the Biometric Registration Authority for the issuing of biometric organization identifiers and the registration of BDB formats, CBEFF patron formats, security block formats, and biometric products.

1.10   A future part of ISO/IEC 19785 (ISO/IEC 19785-3) will specify several patron format specifications for which ISO/IEC JTC 1 SC 37 is the CBEFF patron.

1.11   Protection of the privacy of individuals from inappropriate dissemination and use of biometric data is not in the scope of this part of ISO/IEC 19785, but may be subject to national regulation.

2 Conformance

2.1 A conforming CBEFF patron

a) shall define CBEFF patron formats in accordance with the requirements of 6.2 (CBEFF simple BIR structure) or in accordance with the requirements of 6.3 (CBEFF complex BIR structure);

b) shall include in the specification of a patron format

1) the (human-readable) name of the CBEFF patron,

2) the decimal and hex values of the patron identifier assigned by the Biometric Registration Authority for ISO/IEC 19785-2,

3) the (human-readable) patron format name,

4) the decimal and hex values of the patron format identifier that the CBEFF patron has assigned to this patron format,

5) the full ASN.1 object identifier for this patron format in both ASN.1 value notation and in XML value notation formats,

6) a description of the intended domain of use,

7) the version identifier of the patron format,

8) the version of CBEFF under which the patron format is specified,

9) the specification of the CBEFF-defined data elements and abstract values that are supported,

10) the specification of any additional, patron-defined data elements and abstract values that are supported

11) transformation requirements for the CBEFF_BDB_quality and the CBEFF_BIR_validity_period data elements,

12) the abstract values and semantics of the content of the CBEFF_BDB_index and the CBEFF_BIR_index (if used)";

c) shall include a completed patron format conformance statement in its patron format specification in accordance with Annex A.

2.2 A conforming biometric transformation implementation shall transform a BIR in one CBEFF patron format into a BIR in the same or a different CBEFF patron format in accordance with the requirements of 6.4 and 6.5.

2.3 An implementation shall claim to support a (specified) CBEFF patron format if and only if it is capable of encoding abstract values into or decoding abstract values from that (specified) CBEFF patron format.

3 Normative references

The following referenced documents are indispensable for the application 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 8601:2004, *Data elements and interchange formats — Information interchange — Representation of dates and times*

ISO/IEC 10646:2003, *Information technology — Universal Multiple-Octet Coded Character Set (UCS)*

ISO/IEC 19784-1, *Information technology — Biometric application programming interface — Part 1: BioAPI specification*

ISO/IEC 19785-2, *Information technology — Common Biometric Exchange Formats Framework — Part 2: Procedures for the operation of the Biometric Registration Authority*

4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

4.1
BDB format
format of a BDB defined by a CBEFF biometric organization

4.2
BDB format identifier
unique (within a biometric organization) identifier of a format for a BDB, where that format has been fully defined by a CBEFF biometric organization called the BDB format owner

4.3
BDB format owner
CBEFF biometric organization that defines a BDB format and assigns a BDB format identifier to it

4.4
biometric (adj.)
pertaining to the field of biometrics

4.5
biometrics
automated recognition of individuals based on their behavioural and biological characteristics

4.6
biometric data block
BDB
block of data with a defined format that contains one or more biometric samples or biometric templates (see 6.2.2)

NOTE   The parts of ISO/IEC 19794 specify internationally standardized BDB formats for several biometric types.

4.7
biometric information record
BIR
data structure containing one or more BDBs together with information identifying the BDB formats, and possibly further information such as whether a BDB is encrypted or the BIR is signed

NOTE   This is a general definition applying to all BIRs. See 4.22 and 4.31 for complex BIR and simple BIR.

4.8
biometric product
software or hardware (or a combination of software and hardware) which is assigned a biometric product identifier by a CBEFF biometric organization, called the biometric product owner of the biometric product

4.9
biometric product identifier
identifier assigned to a biometric product that unambiguously identifies the biometric product within the biometric products that have been assigned an identifier by a biometric product owner

4.10
biometric product owner
CBEFF biometric organization that assigns biometric product identifiers to biometric products

NOTE   The organization may or may not be the manufacturer of the products.

4.11
biometric sample
information obtained from a biometric device, either directly or after further processing

cf. raw biometric sample, intermediate biometric sample, processed biometric sample

4.12
biometric template
biometric sample or combination of biometric samples that is suitable for storage as a reference for future comparison

4.13
biometric transformation
transformation of a BIR in an source patron format into a BIR in a target patron format

NOTE   This can (but need not) include processing of the content of the BDB (see 6.5.11 and 6.5.14).

4.14
CBEFF biometric organization
organization that is accepted for registration with the Biometric Registration Authority in accordance with ISO/IEC 19785-2

NOTE   A CBEFF biometric organization can define BDB formats, assign BDB format identifiers to them, assign biometric product identifiers to biometric products, define SB formats and assign SB format identifiers to them. If the organization is also accepted as a CBEFF patron, it can also define CBEFF patron formats and assign CBEFF patron format identifiers to them.

4.15
CBEFF biometric organization identifier
unique identifier assigned to a CBEFF biometric organization when it registers with the Biometric Registration Authority in accordance with ISO/IEC 19785-2

4.16
CBEFF patron
recognized standards development organization (which can be a standards body, working group, or industry consortium) that has been accepted for registration with the Biometric Registration Authority in accordance with ISO/IEC 19785-2 as a CBEFF patron, and that can therefore specify one or more CBEFF patron formats

4.17
CBEFF patron format
format for a BIR that is fully-defined by a CBEFF patron (see 6.2 and 6.3)

4.18
CBEFF patron format identifier
identifier for a CBEFF patron format that is unambiguous within the context of a CBEFF patron identifier

4.19
CBEFF patron identifier
CBEFF biometric organization identifier of a CBEFF patron

4.20
CBEFF root header
CBEFF standard biometric header that precedes all other standard biometric headers in a complex CBEFF BIR structure

4.21
CBEFF sub-header
CBEFF standard biometric header in a complex CBEFF BIR structure that follows the CBEFF root header and that either immediately precedes a BDB or is followed by further CBEFF sub-headers (see 6.3)

4.22
complex CBEFF BIR structure
structure for a CBEFF BIR that can contain multiple BDBs, each having its own SBH, plus additional SBHs that express the relationships among the BDBs (see 6.3)

4.23
domain of use
application space defined by a CBEFF patron where a CBEFF patron format specified by that patron is intended to be used

4.24
intermediate biometric sample
biometric sample obtained by processing a raw biometric sample, intended for further processing

4.25
processed biometric sample
biometric sample suitable for comparison

4.26
raw biometric sample
biometric sample obtained directly from a biometric device

4.27
security block
SB
block of data with a defined format that contains information concerning the encryption of BDBs in a BIR and the integrity of the BIR

4.28
security block format
format of a security block defined by a CBEFF biometric organization

4.29
security block format identifier
unique (within a biometric organization) identifier of a format for a security block, where that format has been fully defined by a CBEFF biometric organization (called the security block format owner)

4.30
security block format owner
CBEFF biometric organization that defines a security block format and assigns a security block format identifier to it

4.31
simple CBEFF BIR structure
structure for a CBEFF BIR that contains precisely one SBH and one BDB (see 6.2)

4.32
source BIR
CBEFF BIR that is the input to a transforming application

4.33
standard biometric header
SBH
part of a CBEFF compliant BIR structure that provides encodings for abstract values of CBEFF data elements and enables an application to obtain knowledge about the format and other properties (such as creation date) of the BDBs that are contained in the BIR without having to process the BDBs themselves

NOTE   BDBs are not required to be (and generally are not) self-identifying. Identification of BDB formats is provided in CBEFF data elements.

4.34
target BIR
CBEFF BIR that is the output of a transforming application

5   Symbols and abbreviated terms

BDB   biometric data block

BIR   biometric information record

BSP   Biometric Service Provider (see ISO/IEC 19784-1)

CBEFF   Common Biometric Exchange Formats Framework

MAC   message authentication code

PFCS   patron format conformance statement

SB   security block

SBH   standard biometric header

UTC   coordinated universal time (see ISO 8601)

6   Requirements

6.1   General

6.1.1   CBEFF allows the specification of CBEFF patron formats based on either the simple CBEFF BIR structure (see 6.2) or the complex CBEFF BIR structure (see 6.3).

6.1.2   CBEFF patron formats may, but need not, be registered and have their CBEFF patron format identifiers (assigned by the CBEFF patron) published by the Biometric Registration Authority (see ISO/IEC 19785-2).

NOTE   Patron formats that are not registered may not be usable in environments where interoperability or transformation of BIRs is a requirement.

6.1.3   It is intended that a single CBEFF patron format would normally be the only patron format used in a given domain of use, so its identification could be implicit in that domain of use. Where more than one CBEFF patron format is needed in a given domain of use (perhaps for historical reasons), the identification of the multiple patron formats is by local means, which could, but need not, make use of a registered patron format identifier, or of an identification issued by a CBEFF patron that is recognized for that domain of use.

6.1.4   A CBEFF biometric organization can define BDB formats and SB formats and assign identifiers to them. BDB format and SB format identifiers shall be integers within the range 1 to 65535. Each identifier shall be unambiguous within the BDB formats or SB formats defined by the CBEFF biometric organization. The biometric organization is called the BDB format owner or SB format owner of that BDB or SB format. The BDB format is thus identified by the pair "BDB format owner - BDB format identifier" and the SB format is identified by the pair "SB format owner - SB format identifier". The BDB or SB format owner may (but need not) register the BDB or SB format identifier in accordance with ISO/IEC 19785-2.

6.1.5   One of the goals of CBEFF is to uniquely identify the format of every BDB and SB within a BIR. The combination of BDB or SB format owner and BDB or SB format identifier meets this objective.

6.1.6   Another goal of CBEFF is to enable the unique identification of the originator of a BDB within a BIR. The combination of BDB product owner and BDB product identifier, when included in a patron format, meets this objective. A CBEFF biometric organization can assign a biometric product identifier to a software or hardware product. The product may (but need not) be produced or specified by that organization. A biometric