BS ISO/IEC 19785-1:2020

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Information technology — Common Biometric Exchange Formats Framework

Part 1: Data element specification

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National foreword

This British Standard is the UK implementation of ISO/IEC 19785-1:2020. It supersedes BS ISO/IEC 19785-1:2015, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee IST/44/-/2, Biometric technical interfaces.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Part 1: Data element specification

Technologies de l'information — Cadre de formats d'échange biométriques communs —

Partie 1: Spécification des éléments de données

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Contents

Page

Foreword ... **vi**
Introduction ... **vii**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **2**
4 Abbreviated terms ... **8**
5 Conformance ... **8**
6 Biometric identifiers ... **9**
7 Biometric information record (BIR) structures ... **9**
7.1 General ... 9
7.2 Defining a CBEFF patron format using the simple CBEFF BIR structure ... 11
7.2.1 General ... 11
7.2.2 Standard biometric header (SBH) ... 12
7.2.3 The biometric data block (BDB) ... 12
7.2.4 Security block (SB) ... 13
7.3 Defining a CBEFF patron format using the complex CBEFF BIR structure ... 13
7.4 Defining a CBEFF patron format using the multiple CBEFF BIR structure ... 15
7.5 Applying the self-identifying concept to a CBEFF patron format structure ... 16
8 Performing BIR transformations ... **16**
8.1 General ... 16
8.2 Transformations of enumerated abstract values ... 16
8.3 Transformations of non-enumerated data element values ... 17
9 CBEFF data elements ... **17**
9.1 General ... 17
9.2 CBEFF_BDB_format_owner ... 17
9.2.1 Attributes ... 17
9.2.2 Transformation requirements ... 18
9.3 CBEFF_BDB_format_type ... 18
9.3.1 General ... 18
9.3.2 Attributes ... 18
9.3.3 Transformation requirements ... 18
9.4 CBEFF_BDB_encryption_options ... 18
9.4.1 Attributes ... 18
9.4.2 Requirements on patron format specifications ... 19
9.4.3 Transformation requirements ... 19
9.5 CBEFF_BIR_integrity_options ... 19
9.5.1 Attributes ... 19
9.5.2 Requirements on patron format specifications ... 19
9.5.3 Transformation requirements ... 19
9.6 CBEFF_BIR_self_id_owner ... 20
9.6.1 Attributes ... 20
9.6.2 Transformation requirements ... 20
9.7 CBEFF_BIR_self_id_type ... 20
9.7.1 Attributes ... 20
9.7.2 Transformation requirements ... 20
9.8 CBEFF_subheader_count ... 20
9.9 CBEFF_BDB_biometric_type ... 21
9.9.1 Attributes ... 21
9.9.2 Transformation requirements ... 21
9.10 CBEFF_BDB_biometric_subtype ... 22
9.10.1 Attributes ... 22

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Document Sharing Hub
Full document details: BS ISO/IEC 19785-1:2020

9.10.2 Transformation requirements ... 24
9.11 CBEFF_BDB_capture_device_type_owner ... 24
9.11.1 Attributes ... 24
9.11.2 Transformation requirements ... 25
9.12 CBEFF_BDB_capture_device_type ... 25
9.12.1 General ... 25
9.12.2 Attributes ... 25
9.12.3 Transformation requirements ... 25
9.13 CBEFF_BDB_challenge_response ... 25
9.13.1 Attributes ... 25
9.14 CBEFF_BDB_comparison_algorithm_owner ... 26
9.14.1 Attributes ... 26
9.14.2 Transformation requirements ... 26
9.15 CBEFF_BDB_comparison_algorithm_type ... 26
9.15.1 Attributes ... 26
9.15.2 Transformation requirements ... 26
9.16 CBEFF_BDB_compression_algorithm_owner ... 27
9.16.1 Attributes ... 27
9.16.2 Transformation requirements ... 27
9.17 CBEFF_BDB_compression_algorithm_type ... 27
9.17.1 General ... 27
9.17.2 Attributes ... 27
9.17.3 Transformation requirements ... 27
9.18 CBEFF_BDB_creation_date ... 27
9.18.1 Attributes ... 27
9.18.2 Transformation requirements ... 28
9.19 CBEFF_BDB_feature_extraction_algorithm_owner ... 28
9.19.1 Attributes ... 28
9.19.2 Transformation requirements ... 28
9.20 CBEFF_BDB_feature_extraction_algorithm_type ... 29
9.20.1 General ... 29
9.20.2 Attributes ... 29
9.20.3 Transformation requirements ... 29
9.21 CBEFF_BDB_index ... 29
9.21.1 Attributes ... 29
9.21.2 Transformation requirements ... 29
9.22 CBEFF_BDB_PAD_mechanism_vendor ... 30
9.22.1 Attributes ... 30
9.22.2 Transformation requirements ... 30
9.23 CBEFF_BDB_PAD_mechanism ... 30
9.23.1 Attributes ... 30
9.23.2 Transformation requirements ... 30
9.24 CBEFF_BDB_processed_level ... 30
9.24.1 Attributes ... 30
9.24.2 Transformation requirements ... 31
9.25 CBEFF_BDB_product_owner ... 31
9.25.1 Attributes ... 31
9.25.2 Transformation requirements ... 31
9.26 CBEFF_BDB_product_type ... 31
9.26.1 Attributes ... 31
9.26.2 Transformation requirements ... 32
9.27 CBEFF_BDB_purpose ... 32
9.27.1 Attributes ... 32
9.27.2 Transformation requirements ... 32
9.28 CBEFF_BDB_quality ... 32
9.28.1 Attributes ... 32
9.28.2 Transformation requirements ... 33
9.29 CBEFF_BDB_quality_algorithm_owner ... 33

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Full document details: BS ISO/IEC 19785-1:2020

9.29.1 Attributes 33
9.29.2 Transformation requirements 33
9.30 CBEFF_BDB_quality_algorithm_type 33
9.30.1 General 33
9.30.2 Attributes 33
9.30.3 Transformation requirements 34
9.31 CBEFF_BDB_validity_period 34
9.31.1 Attributes 34
9.31.2 Transformation requirements 34
9.32 CBEFF_BIR_creation_date 34
9.32.1 Attributes 34
9.32.2 Transformation requirements 35
9.33 CBEFF_BIR_creator 35
9.33.1 Attributes 35
9.33.2 Transformation requirements 35
9.34 CBEFF_BIR_index 35
9.34.1 Attributes 35
9.34.2 Transformation requirements 35
9.35 CBEFF_BIR_patron_format_owner 36
9.35.1 Attributes 36
9.35.2 Transformation requirements 36
9.36 CBEFF_BIR_patron_format_type 36
9.36.1 Attributes 36
9.36.2 Transformation requirements 36
9.37 CBEFF_BIR_payload 36
9.37.1 Attributes 36
9.37.2 Transformation requirements 37
9.38 CBEFF_BIR_pointer 37
9.38.1 Attributes 37
9.38.2 Transformation requirements 37
9.39 CBEFF_BIR_validity_period 37
9.39.1 Attributes 37
9.39.2 Transformation requirements 37
9.40 CBEFF_patron_header_version 38
9.40.1 Attributes 38
9.40.2 Transformation requirements 38
9.41 CBEFF_SB_format_owner 38
9.41.1 Attributes 38
9.41.2 Transformation requirements 38
9.42 CBEFF_SB_format_type 39
9.42.1 Attributes 39
9.42.2 Transformation requirements 39
9.43 CBEFF_ version 39
9.43.1 Attributes 39
9.43.2 Transformation requirements 40

Annex A (normative) **Format and content of a patron format conformance statement** 41

Annex B (informative) **Conventions for CBEFF names** 43

Bibliography 44

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see http://patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO/IEC 19785-1:2015), which has been technically revised.

The main changes compared to the previous edition are as follows:

— The self-identifying concept is now permitted to be applied to any of the CBEFF BIR patron formats defined in this document.

— Clarification of presentation attack detection (PAD) terminology has been made.

— Revisions have been made to move a large portion of Clause 6 (Biometric Identifiers) to ISO/IEC 19785-2 since the biometric identifiers are used by the Biometric Registration Authority (BRA).

— Previous versions of this document were published by the US National Institute of Standards and Technology (an agency of the government of the United States of America) and the Biometric Consortium Working Group. The last official non-ISO/IEC release of this document was designated Version 1.1, the first version of this document (ISO/IEC 19785-1:2006) was designated Version 2.0, and the ISO/IEC 19785-1:2015 version was designated Version 3.0. This version of the document is designated Version 4.0 to distinguish the versions of CBEFF products in the marketplace. Version 4.0 is backward compatible with Version 3.0, but the data element names related to PAD have changed.

A list of all parts in the ISO/IEC 19785 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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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 BIR is a data structure containing biometric data and descriptive data elements in accordance with the requirements specified in this document. BIRs are typically stored in a database or transmitted 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) that contains the biometric data. 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. As an example of a BDB format, see the ISO/IEC 19794 series and ISO/IEC 39794 series of documents which specify standardized BDB formats for several biometric types. BIRs are typically stored in a database or transmitted between systems or parts of systems.

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 BIRs. This document defines these data elements.

CBEFF requires that a Biometric Registration Authority (BRA) exists to assign unique identifiers to biometric organizations, BDB formats, SB formats and other CBEFF entities; to publish the identifiers where appropriate; and to ensure that no conflicts occur between identifiers.

A CBEFF biometric organization is any organization, public or private, that requests and receives a biometric organization identifier from the BRA. 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.

A CBEFF patron format is a full specification of encodings for a particular domain of use and developed by a CBEFF patron. A CBEFF patron format implements some or all of the abstract values of the CBEFF data elements defined in this document (possibly with additional abstract values determined by the CBEFF patron) and supports one or more BDBs containing biometric data. 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. As new technologies evolve, the need for new encoding rules (or support of more or different CBEFF data elements) may require new CBEFF patron formats for a given domain of use.

CBEFF also defines the concept of a CBEFF 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 BRA. A BDB format owner can be a public standards organization (that would 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 unique BDB format identifier. The combination of the BDB format identifier and the format owner's biometric organization identifier unambiguously identifies the BDB format. A BDB format identifier and the corresponding format may, but need not, be registered with the BRA.

CBEFF also defines the concepts of a CBEFF biometric product owner, as well as owners or vendors for the following specific product types: capture device, feature extraction algorithm, comparison algorithm, quality algorithm, compression algorithm and presentation attack detection (PAD) mechanism. 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

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owner can be a public standards organization such as a standards body, working group, or industry consortium (such an organization would 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 given organization can be the owner of one or more entities in one or more of these categories (also including BDB formats and SB formats as additional categories), with no restrictions on the number of entities owned by the organization or to which categories those entities may belong.

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, biometric transforming applications, and specific product types mentioned in the previous paragraph. 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 can, but need not, be registered with the BRA. Similarly, biometric product owners of specialized biometric products (such as capture devices, feature extraction algorithms, comparison algorithms, quality algorithms, compression algorithms, or PAD mechanisms) assign identifiers (such as capture device type identifiers, feature extraction algorithm identifiers, etc.) to one or more specialized biometric products. Such biometric product owners may be more specifically referred to by using the name of the specialized biometric product (for example capture device owners and feature extraction algorithm owners).

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

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

This document specifies a simple CBEFF BIR structure, a complex CBEFF BIR structure, and a multiple CBEFF BIR structure (which allows BIR formats with one or more sub-BIRs) and gives the requirements for the specification of a CBEFF patron format based on these abstract data structures.

This document also specifies a self-identifying concept that can be applied to all CBEFF BIR structures so that the patron format can be identified during processing of the SBH without prior knowledge of the patron format type.

This document also specifies transformations of BIRs from one CBEFF patron format into a different CBEFF patron format.

Clause 5 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 9 specifies the CBEFF-defined abstract data elements and the transformation requirements for each data element. CBEFF permits CBEFF patrons to specify additional abstract data elements.

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

Annex B is informative. It explains the naming conventions used for data elements and abstract values specified in this document and in ISO/IEC 19785-3.

ISO/IEC 19785-2 describes the universal identification scheme used by the BRA (which is identified on the webpage https://www.iso.org/maintenance_agencies.html). Procedural information for the BRA is included on the ISO website (https://committee.iso.org/files/live/sites/jtc1sc37/files/ABOUT/Procedural_Information_BRA.pdf). ISO/IEC 19785-3 specifies several patron formats for which ISO/

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IEC JTC 1/SC 37 is the CBEFF patron. ISO/IEC 19785-4 specifies several SB formats for which ISO/IEC JTC 1/SC 37 is the CBEFF patron.

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Information technology — Common Biometric Exchange Formats Framework —

Part 1: Data element specification

1 Scope

This document defines:

— structures and data elements for biometric information records (BIRs);

— the concept of a domain of use to establish the applicability of a standard or specification that conforms with CBEFF requirements;

— the concept of a CBEFF patron format, which is a published BIR format specification that complies with CBEFF requirements, specified by a CBEFF patron;

— the abstract values and associated semantics of a set of CBEFF data elements to be used in the definition of CBEFF patron formats;

This document describes methods to define CBEFF patron formats using CBEFF data elements to specify the structure of BIRs, including the standard biometric headers (SBHs).

This document also provides the means for identification of BDB formats in a BIR, but the standardization and interoperability of BDB formats is not within the scope of this document. This document provides a security block (SB) as a means for BIRs to carry information about the encryption of a BDB in the BIR and about integrity mechanisms applied to the BIR itself. The structure and content of SBs is not within the scope of this document. Further, the specification of encryption mechanisms for BDBs and of integrity mechanisms for BIRs is not within the scope of this document.

This document specifies transformations from one CBEFF patron format to a different CBEFF patron format.

The following are not within the scope of this document:

— the encoding of the abstract values of CBEFF data elements to be used in the specification of CBEFF patron formats; and

— protection of the privacy of individuals from inappropriate dissemination and use of biometric data.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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/IEC 2382-37, *Information technology — Vocabulary — Part 37: Biometrics*

ISO/IEC 10646, *Information technology — Universal coded character set (UCS)*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in 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/

3.1
biometric data block format identifier
BDB format identifier
unique (within a biometric organization) identifier of a format for a biometric data block (BDB), where that format has been fully defined by a *Common Biometric Exchange Format Framework (CBEFF) biometric organization* (3.15) called the *BDB format owner* (3.3)

Note 1 to entry: The BDB format identifier value is NO VALUE AVAILABLE when the BDB does not conform to a defined format.

3.2
biometric data block format
BDB format
format of a biometric data block (BDB) defined by a *Common Biometric Exchange Format Framework (CBEFF) biometric organization* (3.15)

Note 1 to entry: The BDB format value is NO VALUE AVAILABLE when the BDB does not conform to a defined format.

3.3
biometric data block format owner
BDB format owner
Common Biometric Exchange Format Framework (CBEFF) biometric organization (3.15) that defines a *BDB format* (3.2) and assigns to it a *BDB format identifier* (3.1)

Note 1 to entry: The BDB format owner value is NO VALUE AVAILABLE when the BDB does not conform to a defined format.

3.4
biometric data block
BDB
block of data containing biometric information which may or may not conform to a defined format

Note 1 to entry: The BDB is normally opaque to the processing of a *standard biometric header (SBH)* (3.51) and is not required to be self-delimiting.

3.5
biometric information record
BIR
data structure containing one or more *biometric data blocks (BDBs)* (3.4) together with information identifying the BDB formats, and possibly further information, i.e. whether a BDB is encrypted or the BIR is signed

3.6
biometric object
an entity or concept related to the field of biometrics that fits a category definition as established by an international standard and that may be registered by the BRA

Note 1 to entry: Examples of biometric object categories include, but are not limited to, *biometric data blocks (BDBs)* (3.4), *biometric products* (3.7), and *security blocks (SBs)* (3.43). Some international standards which define types of biometric objects include ISO/IEC 19784-1, ISO/IEC 19785-3, all parts of ISO/IEC 19794 and ISO/IEC 39794.

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Note 2 to entry: Biometric objects can, but need not, be registered by the BRA. For example, BDBs that do not conform to a defined format are not registered by the BRA.

3.7
biometric product
software or hardware product or a combination of software and hardware, which is assigned a *biometric product identifier* (3.8) by a *Common Biometric Exchange Format Framework (CBEFF) biometric organization* (3.15) called the *biometric product owner* (3.9) of the biometric product

3.8
biometric product identifier
identifier assigned to a *biometric product* (3.7) that unambiguously identifies the biometric product within the biometric products that have been assigned an identifier by a *biometric product owner* (3.9)

3.9
biometric product owner
Common Biometric Exchange Format Framework (CBEFF) biometric organization (3.15) that assigns *biometric product identifiers* (3.8) to *biometric products* (3.7)

Note 1 to entry: The organization may or may not be the manufacturer of the products.

3.10
Biometric Registration Authority
BRA
registration authority (3.42) that facilitates the globally unambiguous identification of *biometric objects* (3.6) and biometric organizations by maintaining and publishing a register of unique ASN.1 object identifiers

Note 1 to entry: The BRA is managed separately from ISO/IEC JTC 1.

Note 2 to entry: The BRA is responsible for managing the application process for assignment and registration of identifiers, including the assurance of identifier uniqueness.

3.11
biometric transformation
transformation of a *biometric information record (BIR)* (3.5) in an initial patron format into a BIR in a target patron format

Note 1 to entry: This can (but need not) include processing of the content of the *biometric data block (BDB)* (3.4). See 9.23 and 9.26.

3.12
capture device type
hardware product or a combination of software and hardware which is assigned a *capture device type identifier* (3.13) by a *Common Biometric Exchange Format Framework (CBEFF) biometric organization* (3.15)

3.13
capture device type identifier
identifier assigned to a capture device by a *capture device type owner* (3.14) that unambiguously (given the capture device type owner) identifies the capture device

3.14
capture device type owner
Common Biometric Exchange Format Framework (CBEFF) biometric organization (3.15) that assigns *capture device type identifiers* (3.13) to capture devices

Note 1 to entry: The organization may or may not be the manufacturer of the capture devices.

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3.15
Common Biometric Exchange Format Framework biometric organization
CBEFF biometric organization
any organization, public or private, that requests and receives a biometric organization identifier from the *Biometric Registration Authority* (3.10)

Note 1 to entry: A CBEFF biometric organization can define biometric data block (BDB) formats (3.2), assign *BDB format identifiers* (3.1) to them, assign *biometric product identifiers* (3.8) to *biometric products* (3.7), assign capture device identifiers to capture devices, assign *feature extraction algorithm identifiers* (3.33) to *feature extraction algorithms* (3.32), assign *comparison algorithm identifiers* (3.25) to *comparison algorithms* (3.24), assign *quality algorithm identifiers* (3.40) to *quality algorithms* (3.39), assign *compression algorithm identifiers* (3.29) to *compression algorithms* (3.28), assign *presentation attack detection (PAD) mechanism identifiers* (3.37) to *PAD mechanisms* (3.36), and define *security block (SB) formats* (3.44) and assign SB format identifiers to them. If the organization is also accepted as a CBEFF patron, it can also define CBEFF patron formats.

3.16
Common Biometric Exchange Format Framework biometric organization identifier
CBEFF biometric organization identifier
unique identifier assigned to a *CBEFF biometric organization* (3.15) when it registers with the *Biometric Registration Authority* (3.10)

3.17
Common Biometric Exchange Format Framework patron
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* (3.10) as a CBEFF patron, and that can therefore specify one or more *CBEFF patron formats* (3.18)

3.18
Common Biometric Exchange Format Framework patron format
CBEFF patron format
format for a *biometric information record (BIR)* (3.5) that is fully defined by a *CBEFF patron* (3.22)

Note 1 to entry: See 7.2, 7.3, 7.4 and 7.5.

3.19
Common Biometric Exchange Format Framework patron format identifier
CBEFF patron format identifier
identifier for a *CBEFF patron format* (3.18) that is unambiguous within the context of a *CBEFF patron identifier* (3.21)

3.20
Common Biometric Exchange Format Framework patron format structure type
CBEFF patron format structure type
CBEFF BIR structure types that may be used to define a *CBEFF patron format* (3.18)

Note 1 to entry: The possible structure types are *Simple CBEFF BIR* (3.48), *Complex CBEFF BIR* (3.27) and *Multiple CBEFF BIR* (3.35) (any of which may be self-identifying).

3.21
Common Biometric Exchange Format Framework patron identifier
CBEFF patron identifier
CBEFF biometric organization identifier (3.16) of a *CBEFF patron* (3.17)

3.22
Common Biometric Exchange Format Framework root header
CBEFF root header
CBEFF standard biometric header (3.51) that precedes all other standard biometric headers in a *complex CBEFF BIR structure* (3.27) or a *multiple CBEFF BIR structure* (3.35) and which does not have *a biometric data block (BDB)* (3.4) associated with it

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3.23
Common Biometric Exchange Format Framework sub-header
CBEFF sub-header
CBEFF standard biometric header (3.51) in a *complex CBEFF BIR structure* (3.27) that follows the *CBEFF root header* (3.22) and that either immediately precedes a *biometric data block (BDB)* (3.4) or is followed by further CBEFF sub-headers

Note 1 to entry: See 7.3.

3.24
comparison algorithm
algorithm which measures the similarity or dissimilarity between biometric references (or between a biometric reference and a biometric probe), and which may be assigned a *comparison algorithm identifier* (3.25) by a *CBEFF biometric organization* (3.15)

3.25
comparison algorithm identifier
identifier assigned to a *comparison algorithm* (3.24) that unambiguously identifies the algorithm, given the *comparison algorithm owner* (3.26)

3.26
comparison algorithm owner
Common Biometric Exchange Format Framework (CBEFF) biometric organization (3.15) that assigns *comparison algorithm identifiers* (3.25) to *comparison algorithms* (3.24)

Note 1 to entry: The organization may or may not be the intellectual property owner of the *comparison algorithms* (3.24).

3.27
complex Common Biometric Exchange Format Framework biometric information record structure
complex CBEFF BIR structure
structure for a CBEFF BIR that can contain multiple *biometric data blocks (BDBs)* (3.4), each having its own *standard biometric header (SBH)* (3.51), plus additional SBHs that express the relationships among the BDBs

Note 1 to entry: See 7.3.

3.28
compression algorithm
algorithm which performs compression of a biometric sample or biometric template and may be assigned a *compression algorithm identifier* (3.29) by a *Common Biometric Exchange Format Framework (CBEFF) biometric organization* (3.15)

3.29
compression algorithm identifier
identifier assigned to a *compression algorithm* (3.28) that unambiguously identifies the algorithm, given the *compression algorithm owner* (3.30)

3.30
compression algorithm owner
Common Biometric Exchange Format Framework (CBEFF) biometric organization (3.15) that assigns *compression algorithm identifiers* (3.29) to *compression algorithms* (3.28)

Note 1 to entry: The organization may or may not be the intellectual property owner of the *compression algorithms* (3.28).

3.31
domain of use
application space defined by a *Common Biometric Exchange Format Framework (CBEFF) patron* (3.17) where a *CBEFF patron format* (3.18) specified by that patron is intended to be used

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3.32
feature extraction algorithm
algorithm which is assigned a feature extraction algorithm identifier by a *Common Biometric Exchange Format Framework (CBEFF) biometric organization* (3.15)

3.33
feature extraction algorithm identifier
identifier assigned to a *feature extraction algorithm* (3.32) that unambiguously (given the *feature extraction algorithm owner* [3.34]) identifies the algorithm

3.34
feature extraction algorithm owner
Common Biometric Exchange Format Framework (CBEFF) biometric organization (3.15) that assigns *feature extraction algorithm identifiers* (3.33) to *feature extraction algorithms* (3.32)

Note 1 to entry: The organization may or may not be the intellectual property owner of the feature extraction algorithms.

3.35
multiple Common Biometric Exchange Format Framework biometric information record structure
multiple CBEFF BIR structure
structure for a CBEFF BIR that can contain one or more BIRs and that is not a complex CBEFF BIR (see 3.27)

3.36
presentation attack detection mechanism
PAD mechanism
mechanism for the automated detection of presentation attacks, that is assigned a *PAD mechanism identifier* (3.37) by a *Common Biometric Exchange Format Framework (CBEFF) biometric organization* (3.15)

3.37
presentation attack detection mechanism identifier
PAD mechanism identifier
identifier assigned to a *PAD mechanism* (3.36) that unambiguously identifies the mechanism when given the *PAD mechanism vendor* (3.38)

3.38
presentation attack detection mechanism vendor
PAD mechanism vendor
Common Biometric Exchange Format Framework (CBEFF) biometric organization (3.15) that assigns *PAD mechanism identifiers* (3.37) to *PAD mechanisms* (3.36)

3.39
quality algorithm
algorithm that assesses the quality of a biometric sample and may be assigned a *quality algorithm identifier* (3.40) by a *CBEFF biometric organization* (3.15)

3.40
quality algorithm identifier
identifier assigned to a *quality algorithm* (3.39) that unambiguously identifies the algorithm, given the *quality algorithm owner* (3.41)

3.41
quality algorithm owner
Common Biometric Exchange Format Framework (CBEFF) biometric organization (3.15) that assigns *quality algorithm identifiers* (3.40) to *quality algorithms* (3.39)

Note 1 to entry: The organization may or may not be the intellectual property owner of the *quality algorithms* (3.39).

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