
**Information technology — Common
Biometric Exchange Formats
Framework —**

**Part 3:
Patron format specifications**

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

Partie 3: Spécifications de format d'utilisateur

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Contents

	Page
Foreword.....	vii
Introduction.....	viii
1 Scope.....	1
2 Conformance.....	1
3 Normative references.....	1
4 Terms and definitions.....	2
5 Symbols and abbreviated terms.....	2
6 ASN.1 type definitions for CBEFF data elements and abstract values.....	2
6.1 General.....	2
6.2 CBEFF data elements type definitions module.....	2
7 Patron format specification: Minimum simple bit-oriented patron format (deprecated).....	5
7.1 Patron.....	5
7.2 Patron format owner.....	5
7.3 Patron format name.....	5
7.4 Patron format type.....	5
7.5 ASN.1 object identifier for this patron format.....	5
7.6 Domain of use.....	5
7.7 Version identifier.....	5
7.8 CBEFF version.....	5
7.9 General.....	5
7.10 Bit oriented patron format specification.....	6
8 Patron format specification: Minimum simple byte-oriented patron format (deprecated).....	6
8.1 Patron.....	6
8.2 Patron format owner.....	6
8.3 Patron format name.....	7
8.4 Patron format type.....	7
8.5 ASN.1 object identifier for this patron format.....	7
8.6 Domain of use.....	7
8.7 Version identifier.....	7
8.8 CBEFF version.....	7
8.9 General.....	7
9 Patron format specification: Fixed-length-fields, byte-oriented patron format using presence bit-map (deprecated).....	7
9.1 Patron.....	7
9.2 Patron format owner.....	7
9.3 Patron format name.....	8
9.4 Patron format type.....	8
9.5 ASN.1 object identifier for this patron format.....	8
9.6 Domain of use.....	8
9.7 Version identifier.....	8
9.8 CBEFF version.....	8
9.9 General.....	8
9.10 Specification.....	9
10 Patron format specification: Fixed-length-fields, bit-oriented patron format using presence bit-map (deprecated).....	11
10.1 Patron.....	11
10.2 Patron format owner.....	11
10.3 Patron format name.....	12
10.4 Patron format type.....	12
10.5 ASN.1 object identifier for this patron format.....	12

10.6	Domain of use	12
10.7	Version identifier	12
10.8	CBEFF version	12
10.9	General	12
10.10	Specification	12
11	Patron format specification: TLV-encoded patron format, for use with smartcards or other tokens	13
11.1	Patron	13
11.2	Patron format owner	13
11.3	Patron format name	13
11.4	Patron format type	13
11.5	ASN.1 object identifier for this patron format	13
11.6	Domain of Use	14
11.7	Version identifier	14
11.8	CBEFF version	14
11.9	General	14
11.10	ASN.1 specification	16
11.11	Tabular representations for information	17
	11.11.1 The Biometric Information Template used for on-card biometric comparison	17
	11.11.2 The Biometric Information Template used for off-card biometric comparison	19
11.12	The Group BIT Data Object	21
11.13	Abstract values and encodings for biometric type and subtype	21
11.14	Illustrative examples	22
12	Patron format specification: complex patron format (deprecated)	22
12.1	Patron	22
12.2	Patron format owner	22
12.3	Patron format name	22
12.4	Patron format type	22
12.5	ASN.1 object identifier for this patron format	22
12.6	Domain of use	23
12.7	Version identifier	23
12.8	CBEFF version	23
12.9	General	23
12.10	Specification	24
12.11	Illustrative examples	28
12.12	ASN.1 definition (provided for illustrative purposes only)	32
13	Patron format specification: XML patron format (with additional data elements)	34
13.1	Patron	34
13.2	Patron format owner	34
13.3	Patron format name	34
13.4	Patron format type	34
13.5	ASN.1 object identifier for this patron format	34
13.6	Domain of use	34
13.7	Version identifier	34
13.8	CBEFF version	34
13.9	General	34
13.10	Specification	35
13.11	Element <BIR>	36
	13.11.1 Syntax	36
	13.11.2 Semantics	36
13.12	Element <Version>	37
	13.12.1 Syntax	37
	13.12.2 Semantics	37
13.13	Element <CBEFFVersion>	38
	13.13.1 Syntax	38
	13.13.2 Semantics	38
13.14	Element <BIRInfo>	38

13.14.1	Syntax	38
13.14.2	Semantics	39
13.15	Element <BDBInfo>	40
13.15.1	Syntax	40
13.15.2	Semantics	41
13.16	Element <Format> of BDBInfoType	45
13.16.1	Syntax	45
13.16.2	Semantics	45
13.17	Element <Product>	45
13.17.1	Syntax	45
13.17.2	Semantics	45
13.18	Element <CaptureDevice>	46
13.18.1	Syntax	46
13.18.2	Semantics	46
13.19	Element <FeatureExtractionAlgorithm>	46
13.19.1	Syntax	46
13.19.2	Semantics	46
13.20	Element <ComparisonAlgorithm>	47
13.20.1	Syntax	47
13.20.2	Semantics	47
13.21	Element <CompressionAlgorithm>	47
13.21.1	Syntax	47
13.21.2	Semantics	47
13.22	Element <Quality>	47
13.22.1	Syntax	47
13.22.2	Semantics	48
13.23	Element <Algorithm>	48
13.23.1	Syntax	48
13.23.2	Semantics	48
13.24	Element <SBInfo>	48
13.24.1	Syntax	48
13.24.2	Semantics	49
13.25	Element <Format> of SBInfoType	49
13.25.1	Syntax	49
13.25.2	Semantics	49
13.26	Representation of Integers	49
13.27	Representation of Octet Strings	49
13.28	Representation of Date and Time of the Day	50
13.29	Representation of Universally Unique Identifiers	50
13.30	XML schema of the patron format	51
13.31	ASN.1 schema of the patron format	54
13.32	An example of a simple BIR in XML encoding (complying with the ASN.1 schema, the XSD schema, and the normative textual description)	56
13.33	An example of a complex BIR in XML encoding (complying with the ASN.1 schema, the XSD schema, and the normative textual description)	57
14	Patron format specification: complex patron format (with additional data elements)	59
14.1	Patron	59
14.2	Patron format owner	59
14.3	Patron format name	59
14.4	Patron format type	59
14.5	ASN.1 object identifier for this patron format	60
14.6	Domain of use	60
14.7	Version identifier	60
14.8	CBEFF version	60
14.9	General	60
14.10	Specification	61
14.11	Illustrative examples	66
14.12	ASN.1 definition (provided for illustrative purposes only)	70

Annex A (informative) Guidelines on the specification of patron formats	73
Annex B (informative) Conformance of the defined patron formats	77

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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.

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).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

This second edition cancels and replaces the first edition (ISO/IEC 19785-3:2007), Clauses 13 and 15 of which have been merged into [Clause 13](#) (XML patron format). Minor updates have been made throughout the document to reflect vocabulary harmonization and updated committee procedures.

It also incorporates the Amendment ISO/IEC 19785-3:2007/Amd 1:2010.

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

- *Part 1: Data element specifications*
- *Part 2: Procedures for the operation of the Biometric Registration Authority*
- *Part 3: Patron format specifications*
- *Part 4: Security block format specifications*

Introduction

Biometric-based authentication systems and applications are expected to support multiple biometric devices and multiple biometric data formats. The Common Biometric Exchange Formats Framework (CBEFF) promotes interoperability of biometric-based application programs and systems developed by different vendors by facilitating biometric data interchange.

ISO/IEC 19785-1:2006 defines the following items that enable standardized biometric data interchange:

- a) a 3-part standardized structure for biometric information records (BIRs) consisting of:
 - 1) standardized biometric headers (SBHs);
 - 2) biometric data blocks (BDBs, which can be standardized or proprietary);
 - 3) optional security blocks (SBs);
- b) variations of the 3-part structure to support BIRs containing:
 - 1) only one SBH, one BDB, and possibly one SB (simple BIRs);
 - 2) more than one BDB along with the SBHs necessary to encode the BIR's structure and some number of SBs (complex BIRs);
- c) more than 20 data elements and their associated abstract values that can be used in an SBH to describe attributes of a BDB within a BIR, as well as attributes of the BIR itself;
- d) the concept of a CBEFF patron format (but ISO/IEC 19785-1:2006 does not itself define any patron formats), which is a detailed specification of the structure and content of a particular, standardized BIR;
- e) the concept of a CBEFF patron, which is a recognized standards organization that has registered with the Biometric Registration Authority and declared its intention to define CBEFF patron format specifications;
- f) the concept of the Biometric Registration Authority (RA), which is the mechanism by which unique identifiers are assigned to organizations (standards organizations, vendors, and others) that create BDB formats and CBEFF patron formats (ISO/IEC 19785-2:2006 defines the responsibilities and operations of the Biometric RA);
- g) CBEFF data elements [see c) above] that support, within the SBH, the unique identifiers assigned by the Biometric RA for biometric organizations, BDB formats, biometric products, capture devices, feature extraction algorithms, comparison algorithms, quality algorithms, compression algorithms, patron formats, and SB formats.

Patron formats can be specified in other standards documents and registered in the CBEFF Registration Authority (see ISO/IEC 19785-2:2006), for example, there is a registered patron format specified in ISO/IEC 9834-1:2006. For a complete list of registered patron formats, consult the CBEFF Registration Authority web site.

This part of ISO/IEC 19785 specifies a number of CBEFF patron formats that are considered to be of general utility in a variety of domains of use. Additional SC 37 patron format specifications can be published as new clauses in future amendments to this part of ISO/IEC 19785, or in other SC 37 International Standards.

The CBEFF patron format type unambiguously identifies the CBEFF patron format within the scope of the CBEFF patron format owner. The CBEFF patron format type is unambiguous within the scope of an ASN.1 Object Identifier (see ISO/IEC 9834-1) that identifies the Biometric Registration Authority (see

ISO/IEC 19785-2:2006). That ASN.1 Object Identifier (OID) is itself globally unambiguous within the scope of all ASN.1 Object Identifiers, which forms a widely-used global name-space.

NOTE ASN.1 Object Identifiers are used by ITU-T, ITU-R, the UPU, many ISO, and IEC Standards, to identify some IETF MIME types, and for many other purposes. (These acronyms have not been spelled out, as the precise identification of these organizations is not relevant to this International Standard.)

The combination of the Biometric Registration Authority OID, the CBEFF patron format owner, and the CBEFF patron format type forms a larger ASN.1 OID that provides an unambiguous identification of the CBEFF patron format. This part of ISO/IEC 19785 specifies, for each CBEFF patron format that it defines, the ASN.1 OID that unambiguously identifies that CBEFF patron format.

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Information technology — Common Biometric Exchange Formats Framework —

Part 3: Patron format specifications

1 Scope

This part of ISO/IEC 19785 specifies and publishes registered CBEFF patron formats (see ISO/IEC 19785-1) defined by the CBEFF patron ISO/IEC JTC 1/SC 37, and specifies their registered CBEFF patron format types (see ISO/IEC 19785-2) and resulting full ASN.1 Object Identifiers.

2 Conformance

[Clauses 6](#) onwards of this part of ISO/IEC 19785 specify at the bit-level the set of bit-patterns (and their semantics) that can form a valid instance of the CBEFF patron format that is defined in that clause, together with the ASN.1 Object Identifier for that set of bit-patterns.

A bit-pattern identified by one of the ASN.1 Object Identifiers allocated in this part of ISO/IEC 19785 conforms to this specification if and only if it is one of the bit-patterns in the set identified by that ASN.1 Object Identifier.

If an implementation claims that it supports (and conforms to) a CBEFF patron format defined in this part of ISO/IEC 19785, then it shall either be:

- a) capable of generating at least one of the set of bit patterns specified for that CBEFF patron format, and shall never generate bit patterns that are not part of the set, or
- b) capable of decoding (determining the semantics of), or in any other way processing all the bit-patterns in the set of bit patterns specified for that CBEFF patron format.

NOTE If a decoding implementation is presented with a bit pattern that purports to be part of the set, but it is not, there is no requirement placed on the action taken by the implementation, but it is normally expected that the implementation will guard against denial of service or other security threats in such circumstances.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 7816-4, *Identification cards — Integrated circuit cards — Part 4: Organization, security and commands for interchange*

ISO/IEC 7816-6, *Identification cards — Integrated circuit cards — Part 6: Interindustry data elements for interchange*

ISO/IEC 7816-11, *Identification cards — Integrated circuit cards — Part 11: Personal verification through biometric methods*

ISO 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*

ISO/IEC 8824-1, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation — Part 1*

ISO/IEC 8825-1, *Information technology — ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER) — Part 1*

ISO/IEC 8825-4:2008, *Information technology — ASN.1 encoding rules: XML Encoding Rules (XER) — Part 4*

ISO/IEC 10646, *Information technology — Universal Coded Character Set (UCS)*

ISO/IEC 19785-1:2006, *Information technology — Common Biometric Exchange Formats Framework — Part 1: Data element specification*

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

ISO/IEC 24787, *Information technology — Identification cards — On-card biometric comparison*

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19785-1 and the following apply.

4.1

TLV encoding

common form of encoding (with many variants) in which every field in the encoding has an assigned type (or tag) that is unambiguous in some context, a length determinant, and a value part that can contain further TLV components, nested to any depth

5 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviated terms given in ISO/IEC 19785-1:2006 and the following apply.

TLV Type (or Tag) Length and Value

6 ASN.1 type definitions for CBEFF data elements and abstract values

6.1 General

This clause specifies in 6.2 an ASN.1 module CBEFF-DATA-ELEMENTS that defines types (see ITU-T Rec. X.680 | ISO/IEC 8824-1) for each of the CBEFF data elements. These type definitions are fully aligned with the abstract values of CBEFF data elements specified in ISO/IEC 19785-1:2006 (conforming to CBEFF version “major(2) minor(0)”, and do not in themselves specify encodings of those abstract values. Encodings are determined by the patron formats specified in ASN.1 in this part of ISO/IEC 19785.

6.2 CBEFF data elements type definitions module

```
CBEFF-DATA-ELEMENTS
{iso standard 19785 modules(0) types-for-cbeff-data-elements(1)}
DEFINITIONS
AUTOMATIC TAGS ::=
BEGIN

BDBFormat ::= SEQUENCE {
    formatOwner    INTEGER (1..65535),
    formatType     INTEGER (1..65535) }

EncryptionOptions ::= BOOLEAN
```

```

-- NO ENCRYPTION = false, ENCRYPTION = true.

IntegrityOptions ::= BOOLEAN
-- NO INTEGRITY = false, INTEGRITY = true.

SubheaderCount ::= INTEGER (0..255)
BiometricType ::= BIT STRING
{noValueAvailable          (0),
 multipleBiometricTypes    (1),
 scent                     (2),
 dna                       (3),
 ear                       (4),
 face                     (5),
 finger                   (6),
 foot                     (7),
 handGeometry              (8),
 vein                     (9),
 iris                    (10),
 retina                   (11),
 voice                   (12),
 gait                    (13),
 keystroke                (14),
 lipMovement              (15),
 signatureSign            (16),
 palm                    (17),
 backOfHand               (18),
 wrist                   (19)
} (SIZE (20), ...)

BiometricSubtype ::= CHOICE
{ any AnySubType,
  veinOnly VeinOnly}
-- The abstract value noValueAvailable is encoded as
-- the CHOICE value any:'0000000'
AnySubType ::= BIT STRING
{
  left                    (6),
  right                   (5),
  thumb                  (4),
  indexFinger             (3),
  middleFinger            (2),
  ringFinger              (1),
  littleFinger            (0)} (SIZE (7))

VeinOnly ::= BIT STRING
{
  left                    (6),
  right                   (5),
  palm                   (4),
  backOfHand              (3),
  wrist                   (2),
  reserved1               (1),
  reserved2               (0)} (SIZE (7))

ChallengeResponse ::= OCTET STRING
-- A patron format that uses this type shall specify
-- its encoding for noValueAvailable

BDBCcreationDate ::= Date-Time
-- A patron format that uses this type shall specify
-- its encoding for noValueAvailable
BDBIndex ::= OCTET STRING (SIZE(16))
-- A patron format that uses this type shall specify
-- its encoding for noValueAvailable
ProcessedLevel ::= ENUMERATED
{noValueAvailable,
 raw,
 intermediate,
 processed}
Product ::= SEQUENCE {
  productOwner INTEGER (1..65535) OPTIONAL,

```

```

    productType INTEGER (1..65535) OPTIONAL}
Purpose ::= ENUMERATED
    {noValueAvailable,
    verify,
    identify,
    enroll,
    enrollVerify,
    enrollIdentify,
    audit
    }

Quality ::= INTEGER
    {qualityNotSupported (-2),
    qualityNotRecorded (-1),
    noValueAvailable (0)} (-2..100)
BDBValidityPeriod ::= SEQUENCE
    {notValidBefore Date-Time OPTIONAL,
    notValidAfter Date-Time OPTIONAL}

BIRCreationDate ::= Date-Time
    -- A patron format that uses this type shall specify
    -- its encoding for noValueAvailable
Creator ::= UTF8String
    -- A patron format that uses this type shall specify
    -- its encoding for noValueAvailable
BIRIndex ::= OCTET STRING (SIZE(16))
    -- A patron format that uses this type shall specify
    -- its encoding for noValueAvailable
PatronFormat ::= SEQUENCE {
    patronFormatOwner INTEGER (1..65535) OPTIONAL,
    patronFormatType INTEGER (1..65535) OPTIONAL}
Payload ::= OCTET STRING
    -- A patron format that uses this type shall specify
    -- its encoding for noValueAvailable
BIRValidityPeriod ::= SEQUENCE
    {notValidBefore Date-Time OPTIONAL,
    notValidAfter Date-Time OPTIONAL}

SBFormat ::= SEQUENCE {
    sbOwner INTEGER (1..65535) OPTIONAL,
    sbType INTEGER (1..65535) OPTIONAL}
Version ::= SEQUENCE {
    major INTEGER {version1(1), version2(2)} (0..MAX),
    minor INTEGER {version0(0)} (0..MAX)
    --noValueAvailable is encoded by {major 0, minor 0}
}
RegistryID ::= SEQUENCE {
    organization INTEGER (0..MAX),
    type INTEGER (0..MAX)
}

BiometricDataBlock ::= OCTET STRING
SecurityBlock ::= OCTET STRING
Date-Time ::= TIME (SETTINGS
    "Basic=Date-Time
    Date=YMD
    Year=Basic
    Time=HMS
    Midnight = Start
    Local-or-UTC=Z")

OneByte ::= INTEGER (0..255)
TwoByte ::= INTEGER (0..65535)
ThreeByte ::= INTEGER (0..16777215)
FourByte ::= INTEGER (0..4294967295)
OneBit ::= INTEGER (0..1)
TwoBit ::= INTEGER (0..3)
ThreeBit ::= INTEGER (0..7)
FourBit ::= INTEGER (0..15)
END

```

7 Patron format specification: Minimum simple bit-oriented patron format (deprecated)

7.1 Patron

ISO/IEC JTC 1/SC 37

This patron format is considered deprecated. Therefore it shall not be used in new developments or deployments.

7.2 Patron format owner

257 (0101_{Hex}). The Biometric Registration Authority has allocated this identifier for ISO/IEC JTC 1/SC 37.

7.3 Patron format name

ISO/IEC JTC 1/SC 37 minimum simple bit-oriented patron format

7.4 Patron format type

1 (0001_{Hex}). This has been registered in accordance with ISO/IEC 19785-2.

7.5 ASN.1 object identifier for this patron format

```
{iso registration-authority cbeff(19785) biometric-organization(0) jtc1-sc37(257) patron-format(1) simple-bit-oriented(1)}
```

or, in XML value notation,

```
<OBJECT_IDENTIFIER>1.1.19785.0.257.1.1 </OBJECT_IDENTIFIER>
```

7.6 Domain of use

This patron format defined minimum length simple BIRs that may be of general utility in domains of use that wish to minimise data overhead in order to reduce storage or transfer bandwidth and processing costs at the expense of information content.

BIRs coded with this patron format shall be simple BIRs, not containing SB, and being able to accept loss of byte alignment.

As this patron format does not support the use of SB, CBEFF_BDB_encryption_options and CBEFF_BIR_integrity_options, are intrinsically considered set to, respectively, NO ENCRYPTION and NO INTEGRITY.

7.7 Version identifier

This patron format specification has a version identifier of (major 0, minor 0).

7.8 CBEFF version

This specification conforms to CBEFF version (major 2, minor 0).

7.9 General

This clause defines a minimum conforming patron format. The formal specification of the actual bits-on-the-line for this patron format is provided by a reference to the ASN.1 encoding rules.

The MinimumElementsBitOriented patron format is formally defined as the ASN.1 PER-unaligned encoding rules applied to the MinimumElementsBitOriented type specified in 0.

An example of the encoding produced by an assignment of abstract values for this patron format, showing the size and encoding of each field of the SBH, is given in Table 1. The size of the SBH is **one octet** for BDB formats standardized by SC 37, but can be greater for other BDB formats. The BDB length encoding is one octet if the BDB encoding is less than 128 bytes, making the total size of the BIR 2 octets plus the length of the BDB.

Table 1 — Bit oriented minimum SBH (1 byte)

Format owner is SC 37? 0	Format type is <64? 0	Format type value
← 8 bits →		

7.10 Bit oriented patron format specification

Specification

```

CBEFF-MINIMUM-SUPPORT-BIT-ORIENTED
{iso standard 19785 modules(0)
minimumElementsWithDefaultsBitOriented(2)}
DEFINITIONS
AUTOMATIC TAGS ::=
BEGIN

IMPORTS BiometricDataBlock
FROM CBEFF-DATA-ELEMENTS
{iso standard 19785 modules(0) types-for-cbeff-data-elements(1)};
MinimumElementsBitOriented ::= SEQUENCE {

    /* This patron format contains only mandatory data elements and
    uses bit-level encoding for optimal use of encoding space.*/
    /* This patron format supports only the abstract values NO
    ENCRYPTION and NO INTEGRITY, which are encoded as zero length
    fields.*/
    format SEQUENCE {
        owner INTEGER (0.. 65535) DEFAULT 257,
        -- 257 is the biometric organization identifier of
        -- ISO/IEC JTC 1/SC 37
        type INTEGER (0..63, ..., 64 .. 65535)},
    bdb BiometricDataBlock (SIZE(0..127, ..., 128 .. MAX))}
END

```

8 Patron format specification: Minimum simple byte-oriented patron format (deprecated)

8.1 Patron

ISO/IEC JTC 1/SC 37

This patron format is considered deprecated. Therefore it shall not be used in new developments or deployments.

8.2 Patron format owner

257 (0101_{Hex}). The Biometric Registration Authority has allocated this identifier for ISO/IEC JTC 1/SC 37.

8.3 Patron format name

ISO/IEC JTC 1/SC 37 minimum simple byte-oriented patron format.

8.4 Patron format type

2 (0002_{Hex}). This has been registered in accordance with ISO/IEC 19785-2.

8.5 ASN.1 object identifier for this patron format

```
{iso registration-authority cbeff(19785) biometric-organization(0) jtc1-sc37(257) patron-format(1) simple-byte-oriented(2)}
```

or, in XML value notation,

```
<OBJECT_IDENTIFIER>1.1.19785.0.257.1.2 </OBJECT_IDENTIFIER>
```

8.6 Domain of use

This clause provides the definition of a minimum patron format for simple BIR structures that may be of general utility in domains of use that wish to minimise the overhead of the SBH in order to reduce storage or transfer bandwidth and processing costs at the expense of information content, and that require byte alignment, and do not require ENCRYPTION and INTEGRITY.

8.7 Version identifier

This patron format specification has a version identifier of (major 0, minor 0).

8.8 CBEFF version

This specification conforms to CBEFF version (major 2, minor 0).

8.9 General

An example of the encoding produced by an assignment of abstract values for this patron format, showing the size and encoding of each field of the SBH, is given in [Table 2](#). The size of the SBH for this patron format is fixed at 4 octets.

Table 2 — Byte oriented minimum SBH

Format Owner (16 bits)	Format Type (16 bits)
---------------------------	--------------------------

9 Patron format specification: Fixed-length-fields, byte-oriented patron format using presence bit-map (deprecated)

9.1 Patron

ISO/IEC JTC 1/SC 37

This patron format is considered deprecated. Therefore it shall not be used in new developments or deployments.

9.2 Patron format owner

257 (0101_{Hex}). The Biometric Registration Authority has allocated this identifier for ISO/IEC JTC 1/SC 37.

9.3 Patron format name

ISO/IEC JTC 1/SC 37 Maximum simple patron format (byte oriented) using presence bit-map.

9.4 Patron format type

3 (0003_{Hex}). This has been registered in accordance with ISO/IEC 19785-2.

9.5 ASN.1 object identifier for this patron format

```
{iso registration-authority cbeff(19785) biometric-organization(0) jtc-sc37 (257) patron-format (1) presence-byte-oriented (3)}
```

or, in XML value notation,

```
<OBJECT_IDENTIFIER>1.1.19785.0.257.1.3 </OBJECT_IDENTIFIER>
```

9.6 Domain of use

This patron format defines the structure of an interoperable BIR that allows the coding of as many fields as requested from the ones defined for the SBH, and wish to have a byte-oriented encoding to ease implementations.

9.7 Version identifier

This patron format specification has a version identifier of (major 0, minor 0).

9.8 CBEFF version

This specification conforms to CBEFF version (major 2, minor 0).

9.9 General

This patron format supports the 12 fixed length, optional CBEFF data elements and their abstract values that are permitted in a simple BIR format (thus excluding CBEFF_BIR_patron_format_owner and CBEFF_BIR_patron_format_type), plus CBEFF_subheader_count, plus the patron-format-defined field bdbLength. It contains an initial bit map that identifies the optional fields present in an encoded SBH. The omission of these fields either encodes NO VALUE AVAILABLE, or encodes a specific default value (specified in the patron format specification) for the CBEFF data element. The presence bit map adds two octets, so if all optional fields have the default values, the size of this SBH would be 6 octets. This patron format does not support ENCRYPTION or INTEGRITY, and thus does not support CBEFF_SB_format_owner and CBEFF_SB_format_type.

9.10 Specification

CBEFF data element name	Field name	Length (octets)	Abstract values and Encodings ^a
n/a: patron-defined data element	present	2	
	bioType-p bioSubtype-p bdbCreation-p procLevel-p	1 bit 1 bit 1 bit 1 bit	PRESENT: b'1' or NOT PRESENT: b'0' for each
	product-p purpose-p quality-p bdbValidity-p	1 bit 1 bit 1 bit 1 bit	
	birCreation-p birValidity-p patronHdrVers-p vers-p	1 bit 1 bit 1 bit 1 bit	
	subHeadCt-p bdbLength-p reserved	1 bit 1 bit 2 bits	b'00'
CBEFF_BDB_format_owner	BDB-format owner	4 2	Integer: 0...65535
CBEFF_BDB_format_type	type	2	Integer: 0...65535
CBEFF_BDB_encryption_options	n/a	0	NO ENCRYPTION
CBEFF_BDB_integrity_options	n/a	0	NO INTEGRITY
CBEFF_BDB_biometric_type	bioType	3	<i>This encoding is a 3 octet bitmap. NO VALUE AVAILABLE is encoded as all 0 bits. If MULTIPLE BIOMETRIC TYPES is set, other bits may also be set to enumerate the types contained in the BDB.</i> NO VALUE AVAILABLE: 000000_{Hex} MULTIPLE BIOMETRIC TYPES: 000001_{Hex} FACE: 000002_{Hex} VOICE: 000004_{Hex} FINGER: 000008_{Hex} IRIS: 000010_{Hex} RETINA: 000020_{Hex} HAND GEOMETRY: 000040_{Hex} SIGNATURE OR SIGN: 000080_{Hex} KEYSTROKE: 000100_{Hex} LIP MOVEMENT: 000200_{Hex} GAIT: 001000_{Hex} VEIN: 002000_{Hex}

CBEFF data element name	Field name	Length (octets)	Abstract values and Encodings ^a
			DNA: 004000 _{Hex} EAR: 008000 _{Hex} FOOT: 010000 _{Hex} SCENT: 020000 _{Hex}
CBEFF_BDB_biometric_subtype	bioSubtype	1	<i>This encoding is a 1 octet bitmap.</i> <i>Combinations of abstract values are permitted (by ORing the encodings for those values) when the abstract value encoded in CBEFF_BDB_biometric_type represents a biometric technology that can create a BDB where multiple subtypes are supported.</i> NO VALUE AVAILABLE: b'0000 0000' LEFT: b'0000 0001' RIGHT: b'0000 0010' LEFT THUMB: b'0000 0101' LEFT INDEX FINGER: b'0000 1001' LEFT MIDDLE FINGER: b'0001 0001' LEFT RING FINGER: b'0010 0001' LEFT LITTLE FINGER: b'0100 0001' RIGHT THUMB: b'0000 0110' RIGHT INDEX FINGER: b'0000 1010' RIGHT MIDDLE FINGER: b'0001 0010' RIGHT RING FINGER: b'0010 0010' RIGHT LITTLE FINGER: b'0100 0010' LEFT PALM: b'1000 0101' LEFT BACK OF HAND: b'1000 1001' LEFT WRIST: b'1001 0001' RIGHT PALM: b'1000 0110' RIGHT BACK OF HAND: b'1000 1010' RIGHT WRIST: b'1001 0010'
CBEFF_BDB_creation_date	bdbCreation	7	NO VALUE AVAILABLE: seven 0 octets date/time value: fourteen BCD digits (YYYYMMDDHHMMSS)
CBEFF_BDB_processed_level	procLevel	1	NO VALUE AVAILABLE: 0 RAW: 1 INTERMEDIATE: 2 PROCESSED: 3 RESERVED: 4...15
CBEFF_BDB_product_owner	product owner	4	NO VALUE AVAILABLE: 0
	owner	2	Integer: 1...65535
CBEFF_BDB_product_type	identifier	2	Integer: 1...65535

CBEFF data element name	Field name	Length (octets)	Abstract values and Encodings ^a
CBEFF_BDB_purpose	purpose	1	NO VALUE AVAILABLE: 0 VERIFY: 1 IDENTIFY: 2 ENROLL: 3 ENROLL FOR VERIFICATION ONLY: 4 ENROLL FOR IDENTIFICATION ONLY: 5 AUDIT: 6 RESERVED: 7..15 (shall not be encoded)
CBEFF_BDB_quality	quality	1	NO VALUE AVAILABLE: 0 QUALITY NOT SUPPORTED - BY BDB CREATOR: 255 QUALITY SUPPORTED BY BDB-CREATOR BUT NOT SET: 254 INTEGER VALUE: 0...100
CBEFF_BDB_validity_period	bdbValidity	8	NO VALUE AVAILABLE: eight 0 octets pair of dates (not before, not after): sixteen BCD digits (YYYYMMDDYYYYMMDD)
CBEFF_BIR_creation_date	birCreation	7	NO VALUE AVAILABLE: seven 0 octets date/time value: fourteen BCD digits (YYYYMMDDHHMMSS)
CBEFF_BIR_validity_period	birValidity	8	NO VALUE AVAILABLE: eight 0 octets pair of dates (not before, not after): sixteen BCD digits (YYYYMMDDYYYYMMDD)
CBEFF_patron_header_version	patronFmtVers	1	INTEGER: 0
CBEFF_version	vers	1	Major '2' and Minor '0': 20 _{Hex}
CBEFF_subheader_count	subHeadCt	1	Integer: 0
n/a: patron-defined data element	bdbLength	4	Integer: 0...4294967295
BDB	bdb	See NOTE	See NOTE
NOTE The length, content and encoding of the BDB are not specified by CBEFF nor by this CBEFF-defined patron format specification.			
^a Encodings are specified as binary integers unless otherwise indicated.			

10 Patron format specification: Fixed-length-fields, bit-oriented patron format using presence bit-map (deprecated)

10.1 Patron

ISO/IEC JTC 1/SC 37

This patron format is considered deprecated. Therefore it shall not be used in new developments or deployments.

10.2 Patron format owner

257 (0101_{Hex}). The Biometric Registration Authority has allocated this identifier for ISO/IEC JTC 1/SC 37.

10.3 Patron format name

ISO/IEC JTC 1/SC 37 fixed-length-fields, bit-oriented patron format using presence bit-map.

10.4 Patron format type

4 (0004_{Hex}). This has been registered in accordance with ISO/IEC 19785-2.

10.5 ASN.1 object identifier for this patron format

```
{iso registration-authority cbeff(19785) biometric-organization(0) jtc1-sc37(257) patron-format(1) bit-oriented(4)}
```

or, in XML value notation,

```
<OBJECT_IDENTIFIER>1.1.19785.0.257.1.4 </OBJECT_IDENTIFIER>
```

10.6 Domain of use

This patron format defines the structure of an interoperable BIR that allows the coding of as many fields as requested from the ones defined for the SBH.

10.7 Version identifier

This patron format specification has a version identifier of (major 0, minor 0).

10.8 CBEFF version

This specification conforms to CBEFF version (major 2, minor 0).

10.9 General

The AllElementsWithDefaultsBitOriented patron format uses fixed-width bit-wide fields that are just sufficient to encode the range of abstract values in version 2 of the CBEFF specification, with some reserved abstract values for future addition of abstract values to some CBEFF data elements. Formally, the fields of this patron format are defined by application of the ASN.1 unaligned packed encoding rules (PER-UNALIGNED). All fields in this patron format are assigned default values (including fields that CBEFF requires all patron formats to support) with their presence or absence indicated by an initial bit map. The size of the encoding is 6 octets if all data elements have the default value (usually noValueAvailable), or are absent.

10.10 Specification

```
CCBEFF-FULL-SUPPORT-WITH-DEFAULTS-BIT-ORIENTED
{iso standard 19785 modules(0) allElementsWithDefaultsBitOriented(4)}
DEFINITIONS
AUTOMATIC TAGS ::=
BEGIN

IMPORTS BDBFormat, EncryptionOptions, IntegrityOptions,
SubheaderCount, BiometricType, BiometricSubtype, ChallengeResponse,
BDBCreationDate, BDBIndex, ProcessedLevel, Product, Purpose, Quality,
BDBValidityPeriod, BIRCreationDate, Creator, BIRIndex, PatronFormat,
Payload, BIRValidityPeriod, Version, SBFormat, BiometricDataBlock,
OneByte, TwoByte, ThreeByte, FourByte, OneBit, TwoBit, ThreeBit,
FourBit
FROM CBEFF-DATA-ELEMENTS
{iso standard 19785 modules(0) types-for-cbeff-data-elements(1)};

AllElementsWithDefaultsBitOriented ::= SEQUENCE {
```

```

/* This patron format contains all data elements, but makes full
use of
default values to allow omission of fields. It encodes each CBEFF
data element into a fixed-width bit field.
A 14-bit bit map is present at the start of the
encoding to determine which fields are present. */

format BDBFormat,
encryptOpts EncryptionOptions DEFAULT FALSE,
integOpts IntegrityOptions DEFAULT FALSE,
subHeaderCount SubheaderCount DEFAULT 0,
bdbLength INTEGER (0..4294967295) DEFAULT 0,
bioType BiometricType DEFAULT noValueAvailable,
bioSubtype BiometricSubtype DEFAULT any,
chaResp ChallengeResponse OPTIONAL,
bdbCreation BDBCcreationDate OPTIONAL,
bdbIndex BDBIndex OPTIONAL,
procLevel ProcessedLevel DEFAULT noValueAvailable,
product Product DEFAULT { },
purpose Purpose DEFAULT noValueAvailable,
quality Quality DEFAULT noValueAvailable,
bdbValidity BDBValidityPeriod,
birCreation BIRcreationDate OPTIONAL,
birCreator Creator OPTIONAL,
birIndex BIRIndex OPTIONAL,
patronFormat PatronFormat DEFAULT { },
payload Payload OPTIONAL,
birValidity BIRValidityPeriod,
patronHdrVersion Version DEFAULT {header-major 0, header-minor 0},
sbFormat SBFormat DEFAULT { },
cbeffVers Version DEFAULT {cbeff-major 2, cbeff-minor 0},
bdb BiometricDataBlock
}

END

```

11 Patron format specification: TLV-encoded patron format, for use with smartcards or other tokens

11.1 Patron

ISO/IEC JTC 1/SC 37

11.2 Patron format owner

257 (0101_{Hex}). The Biometric Registration Authority has allocated this identifier for ISO/IEC JTC 1/SC 37.

11.3 Patron format name

ISO/IEC JTC 1/SC 37 TLV-encoded patron format, for use with smartcards or other tokens.

11.4 Patron format type

5 (0005_{Hex}). This has been registered in accordance with ISO/IEC 19785-2.

11.5 ASN.1 object identifier for this patron format

```
{iso registration-authority cbeff(19785) biometric-organization(0) jtc1-
sc37(257) patron-format(1) tlv-encoded(5)}
```

or, in XML value notation,

<OBJECT_IDENTIFIER>1.1.19785.0.257.1.5 </OBJECT_IDENTIFIER>

11.6 Domain of Use

The domain of use is applications complying with ISO/IEC 7816-11. This patron format is applicable for both on-card and off-card biometric comparison.

11.7 Version identifier

This patron format specification has a version identifier of (major 1, minor 1).

11.8 CBEFF version

This specification conforms to CBEFF version (major 2, minor 0).

11.9 General

11.9.1 This clause specifies in [11.10](#):

- a) the CBEFF patron format named “ISO/IEC JTC 1/SC 37 TLV-encoded patron format, for use with smart cards or other tokens” and
- b) a TLV encoding for a number of CBEFF data elements (together with distinct TLV tags) that can be used by any TLV-encoded application that needs to make reference to such data elements.

NOTE The particular form of TLV encoding specified in this clause is that provided by the ASN.1 Distinguished Encoding Rules (see ISO/IEC 8825-1).

11.9.2 ISO/IEC 7816-4 and ISO/IEC 7816-11 define the necessary exchanges to support:

- a) On-card biometric comparison
 - 1) Retrieval of information from a smartcard or other token prior to an external biometric verification process.
 - 2) Commands for performing a biometric verification on a smartcard.
- 3) Strategies for enrollment (recording of information on a smartcard or other token).
- 4) Security mechanisms for establishing a trusted channel between a smartcard and an external system.
- b) Off-card biometric comparison
 - 1) Commands for retrieval of the biometric related data from a smartcard to be used in a service system, e.g. a cross border control system.
 - 2) Security mechanisms for the protection of the biometric related data.

11.9.3 This version of the CBEFF patron format named “ISO/IEC JTC 1/SC 37 TLV-encoded patron format, for use with smartcards or other tokens” is formally defined as the ASN.1 type `BiometricInformationTemplate` (see [11.10](#)) encoded using the ASN.1 Distinguished Encoding Rules (see ISO/IEC 8825-1). A diagrammatic specification of this patron format is provided in [11.11](#).

NOTE The term Biometric Information Template is used in ISO/IEC 7816-11, together with the abbreviation BIT. This term corresponds to a (possibly partial) Biometric Information Record and is used in this clause where the relation with ISO/IEC 7816-11 is important.

11.9.4 The components of the ASN.1 type `BiometricHeaderTemplate` (with their context-specific tags, see [11.10](#)), encoded using the ASN.1 Basic Encoding Rules are also defined as Data Objects for use in ISO/IEC 7816-11.

NOTE The term Biometric Header Template is used in ISO/IEC 7816-11, together with the abbreviation BHT. This term and the abbreviation are synonymous with Standard Biometric Header and SBH, and are used in this clause where the relation with ISO/IEC 7816-11 is important.

11.9.5 The term Biometric Information Data Object is used in ISO/IEC 7816-11 to refer to the TLV-encoding of a specific ASN.1 type. [Table 3](#) records the Biometric Information Data Objects that are defined in 11.10 for use in ISO/IEC 7816-11.

NOTE As ISO/IEC 7816-11 normally describes tags by their hex values, these are included here.

Table 3 — Biometric Information Data Objects with the Biometric Header Template Data Objects defined in 11.10

Biometric Information Data Object	ASN.1 type or component name (see 11.10)	Tag (hex)
Biometric Information Template	<code>BiometricInformationTemplate</code>	7F60 _{Hex}
Group BIT	<code>GroupBIT</code>	7F61 _{Hex}
BDB Reference Data	<code>bdbReferenceData</code>	5F2E _{Hex}
BDB Reference Data Template	<code>bdbReferenceDataTemplate</code>	7F2E _{Hex}
BIR Payload	<code>birPayload</code>	53 _{Hex} or 73 _{Hex}
For use only in Biometric Reference Data Template:		
BDB Reference Data with Standardised Format (Primitive)	<code>standardBDBReferenceData</code>	81 _{Hex}
BDB Reference Data with Standardised Format (Constructed)	<code>standardBDBReferenceDataTemplate</code>	A1 _{Hex}
BDB Reference Data with Proprietary Format (Primitive)	<code>proprietaryBDBReferenceData</code>	82 _{Hex}
BDB Reference Data with Proprietary Format (Constructed)	<code>proprietaryBDBReferenceDataTemplate</code>	A2 _{Hex}
For use only in Biometric Information Template:		
Biometric Header Template	<code>biometricHeaderTemplate</code>	A1 _{Hex}
Algorithm Reference	<code>algorithmReference</code>	80 _{Hex}
Reference Data Qualifier	<code>referenceDataQualifier</code>	83 _{Hex}
For use only in Biometric Header Template:		
Patron Header Version	<code>patronHeaderVersion</code>	80 _{Hex}
BDB Biometric Type	<code>bdbBiometricType</code>	81 _{Hex}
BDB Biometric Subtype	<code>bdbBiometricSubType</code>	82 _{Hex}
BDB Creation Date	<code>bdbCreationDate</code>	83 _{Hex}
BIR Creator	<code>birCreator</code>	84 _{Hex}
BDB Validity Period	<code>bdbValidityPeriod</code>	85 _{Hex}
BDB PID	<code>bdbPID</code>	86 _{Hex}
BDB Format Owner	<code>bdbFormatOwner</code>	87 _{Hex}
BDB Format Type	<code>bdbFormatType</code>	88 _{Hex}
BIR Index	<code>birIndex</code>	90 _{Hex}
Comparison Algorithm Parameters	<code>comparisonAlgParameters</code>	91 _{Hex} or B1 _{Hex}

11.9.6 CBEFF-compliance requires the NO VALUE AVAILABLE abstract value to be supported by this patron format for CBEFF data elements that are not fully supported. To meet this requirement, tags are assigned and reserved by this part of ISO/IEC 19785 in [Table 4](#) for Data Objects appearing in the Biometric Header Template. These tag values shall not be assigned by any other tag authority to Data Objects that can appear in the Biometric Header Template. These Data Objects shall never appear in encodings of this version of this patron format, and their omission represents the NO VALUE AVAILABLE abstract value of the corresponding CBEFF data element.

NOTE Subsequent versions of this patron format may define these Data Objects to support the corresponding CBEFF data element.

Table 4 — Reserved tag values

ASN.1 tag value	Tag value	Corresponding CBEFF data element
[19]	93 _{Hex}	CBEFF_BDB_challenge_response
[20]	94 _{Hex}	CBEFF_BDB_index
[21]	95 _{Hex}	CBEFF_BDB_processed_level
[22]	96 _{Hex}	CBEFF_BDB_purpose
[23]	97 _{Hex}	CBEFF_BDB_quality
[24]	98 _{Hex}	CBEFF_BIR_creation_date
[25]	99 _{Hex}	CBEFF_BIR_patron_format_owner
[26]	9A _{Hex}	CBEFF_BIR_patron_format_type
[27]	9B _{Hex}	CBEFF_BIR_validity_period
[28]	9C _{Hex}	CBEFF_version

11.10 ASN.1 specification

CBEFF-SMARTCARD-BIDO

-- The abbreviation BIDO is used for Biometric Information Data Object
{iso standard 19785 modules(0) types-for-smartcard(8)}

DEFINITIONS

IMPLICIT TAGS ::=

BEGIN

-- In all cases, omission of an optional component that represents a
-- CBEFF data element is the encoding of the NO VALUE AVAILABLE for
-- that data element.

PatronHeaderVersion ::= OCTET STRING (SIZE(2))

-- CBEFF_patron_header_version

-- The first octet encodes the major version number

-- The second octet encodes the minor version number

BiometricType ::= OCTET STRING (SIZE(1..3))

-- CBEFF_BDB_biometric_type

-- The encoding of the abstract values in the value part of the

-- TLV shall be the Recommended Encodings specified in Table 7

-- Note that this is different from the encoding of this type in

-- 9.10 and in other patron formats specified in this part of

-- ISO/IEC 19785.

BiometricSubType ::= OCTET STRING (SIZE(1))

-- CBEFF_BDB_biometric_subtype

-- The encoding of the abstract values in the value part of the

-- TLV shall be the Recommended Encodings specified in Table 8.

-- Note that this is different from the encoding of this type in

-- Table A.2 and in other patron formats specified in this part of

-- ISO/IEC 19785.

BCDTime ::= OCTET STRING (SIZE(7))

-- BCD encoded timestamp with format 'YYYYMMDDHHMMSS'

Creator ::= UTF8String

-- CBEFF_BIR_creator

BCDDate ::= OCTET STRING (SIZE(4))

```

-- BCD encoded date with format 'YYYYMMDD'
BCDDatePeriod ::= OCTET STRING (SIZE(8))
-- Two concatenated BCD encoded dates with format YYYYMMDDYYYYMMDD
ProductID ::= OCTET STRING (SIZE(4))
-- CBEFF_BDB_product_owner in the first two octets
-- CBEFF_BDB_product_type in the last two octets
FormatOwner ::= OCTET STRING (SIZE(2))
-- CBEFF_BDB_format_owner
FormatType ::= OCTET STRING (SIZE(2))
-- CBEFF_BDB_format_type
BIRIndex ::= OCTET STRING
-- CBEFF_BIR_index
BiometricInformationTemplate ::= [APPLICATION 96] SET {
  algorithmReference [0] OCTET STRING (SIZE(1)) OPTIONAL,
  -- A non-CBEFF data element - see ISO/IEC 24787
  referenceDataQualifier [3] OCTET STRING (SIZE(1)) OPTIONAL,
  -- A non-CBEFF data element - see ISO/IEC 24787
  biometricHeaderTemplate [1] BiometricHeaderTemplate,
  bdbReferenceData [APPLICATION 46] EXTERNAL OPTIONAL,
  -- A CBEFF BDB, mandatory for off-card-comparison
  birPayload [APPLICATION 19] OCTET STRING OPTIONAL
  -- CBEFF_BIR_payload, contents defined by ISO/IEC 24787
}
GroupBIT ::= [APPLICATION 97] SET OF BiometricInformationTemplate
BiometricHeaderTemplate ::= SET {
  patronHeaderVersion [0] PatronHeaderVersion
    DEFAULT'0101'H,
  -- The absence of this Data Object represents NO VALUE AVAILABLE
  bdbBiometricType [1] BiometricType OPTIONAL,
  bdbBiometricSubType [2] BiometricSubType OPTIONAL,
  -- Required to be absent unless bdbBiometricType is present
  bdbCreationDate [3] BCDTime OPTIONAL,
  -- CBEFF_BDB_creation_date
  birCreator [4] Creator OPTIONAL,
  bdbValidityPeriod [5] BCDDatePeriod OPTIONAL,
  bdbPID [6] ProductID OPTIONAL,
  bdbFormatOwner [7] FormatOwner,
  bdbFormatType [8] FormatType,
  birIndex [16] BIRIndex OPTIONAL,
  comparisonAlgParameters [17] OCTET STRING OPTIONAL
  -- A non-CBEFF data element - see ISO/IEC 24787
}
END

```

11.11 Tabular representations for information

11.11.1 The Biometric Information Template used for on-card biometric comparison

[Table 5](#) shows the Biometric Information Template (BIT) used for on-card biometric comparison. The BIT has the following substructure:

- a) Data Objects (with tags 80_{Hex} and 83_{Hex}) as defined in ISO/IEC 7816-11, containing values relevant for interindustry commands used for biometric verification as defined in ISO/IEC 7816-4;
- b) Biometric Header Template (BHT) with tag A1_{Hex} as defined in ISO/IEC 7816-11. The tag allocation authority for the Data Objects nested in the BHT is ISO/IEC JTC 1/SC 37 (default tag allocation authority);

NOTE The ASN.1 object identifier for this tag allocation authority is {iso standard 19785 part(3) tag-allocation(1) clause-11(0)}.

- c) Data Objects for CBEFF data elements that are relevant for on-card biometric comparison;
- d) Biometric Data Objects which are on-card biometric comparison specific and only defined in this clause (the biometric comparison algorithm parameters Data Object with tag 91_{Hex} or B1_{Hex}).

Table 5 — The Biometric Information Template used for on-card biometric comparison

Tag	Length	Value			Presence		
7F60 _{Hex}	Var.	Biometric Information Template (BIT)					
		Tag	Length	Value			
		80 _{Hex}	1	Algorithm reference for use in the VERIFY / EXT. AUTHENTICATE / MANAGE SE command as defined in ISO/IEC 7816-4	Optional		
		83 _{Hex}	1	Reference data qualifier for use in the VERIFY / EXT. AUTHENTICATE / MANAGE SE command as defined in ISO/IEC 7816-4	Optional		
		A1 _{Hex}	Var.	Biometric Header Template (BHT) Tag allocation authority: ISO/IEC JTC 1/SC 37	Mandatory		
				Tag	Length	Value	
				80 _{Hex}	2	CBEFF_patron_header_version (default '0101')	Mandatory (if absent, the default value applies)
				90 _{Hex}	Var.	CBEFF_BIR_index, unique identifier used for referencing this biometric data set in an application context outside the card	Optional
				81 _{Hex}	1-3	CBEFF_BDB_biometric_type, see Table 7..	Optional
				82 _{Hex}	1	CBEFF_BDB_biometric_subtype, see Table 8.	Optional, use with biometric type only
				83 _{Hex}	7	CBEFF_BDB_creation_date, creation date and time of biometric reference data: fourteen BCD digits (YYYYMMDDHHMMSS)	Optional
				84 _{Hex}	Var.	CBEFF_BIR_creator	Optional
				85 _{Hex}	8	CBEFF_BDB_validity_period, a pair of dates (not before, not after): sixteen BCD digits (YYYYMMDD-DYYYYMMDD)	Optional
				86 _{Hex}	4	CBEFF_BDB_product_owner, CBEFF_BDB_product_type. Concatenation of product owner and product type, identifying the product that created the biometric reference data	Optional
				87 _{Hex}	2	CBEFF_BDB_format_owner, format owner of the biometric verification data, value assigned by the biometrics registration authority	Mandatory
				88 _{Hex}	2	CBEFF_BDB_format_type, format type of biometric verification data, specified by format owner	Mandatory
				91 _{Hex} / B1 _{Hex}	Var.	Biometric comparison algorithm parameters (primitive / constructed), see note 4	Optional

Table 5 (continued)

Tag	Length	Value			Presence
7F60 _{Hex}	Var.	Biometric Information Template (BIT)			
		Tag	Length	Value	
		80 _{Hex}	1	Algorithm reference for use in the VERIFY / EXT. AUTHENTICATE / MANAGE SE command as defined in ISO/IEC 7816-4	Optional
		83 _{Hex}	1	Reference data qualifier for use in the VERIFY / EXT. AUTHENTICATE / MANAGE SE command as defined in ISO/IEC 7816-4	Optional
		A1 _{Hex}	Var.	Biometric Header Template (BHT) Tag allocation authority: ISO/IEC JTC 1/SC 37	Mandatory
				Tag Length Value	
NOTE 1 In Table 5 the biometric data block as defined in Part 1 of this International Standard is not present, since the biometric reference data are stored separately in the card and not in this BIT. The biometric verification data (format owner and format type indicated in the Data Objects with tag 87_{Hex} and 88_{Hex}) have to be presented to the card using e.g. a ISO/IEC 7816 VERIFY command. NOTE 2 In Table 5 no payload is present, since usually access to a payload, if used by the application, is granted after successful completion of the biometric verification. The payload may be retrieved using ISO/IEC 7816 interindustry access commands like GET DATA or READ BINARY. NOTE 3 The outside world uses format owner / format type for identifying the required structure for the verification data. The biometric comparison algorithm in the card, which is able to process the verification data according to format owner / format type, is addressed by the algorithm reference, if the algorithm reference DataObject is present. NOTE 4 The biometric comparison algorithm Data Object provides any special parameters of an on-card biometric comparison algorithm implementation, e.g. maximum number of minutiae expected in the biometric verification data. The content of this Data Object is defined by the BDB format owner (see e.g. ISO/IEC 19794-2).					

The use of the BIT shown in Table 5, which is intended to be retrieved prior to a biometric user verification, and the verification process itself with the related interindustry commands and their security requirements, are specified in ISO/IEC 7816-11.

11.11.2 The Biometric Information Template used for off-card biometric comparison

Table 6 shows the Biometric Information Template BIT used for off-card biometric comparison. The BIT has the following substructure:

- Biometric Header Template (BHT) with tag A1_{Hex} as defined in ISO/IEC 7816-11. The tag allocation authority for the Data Objects nested in the BHT is ISO/IEC JTC 1/SC 37 (default tag allocation authority);

NOTE The ASN.1 object identifier for this tag allocation authority is {iso standard 19785 part(3) tag-allocation(1) clause-11(0)}.

- Biometric Data Objects for CBEFF data elements that are relevant for off-card biometric comparison;
- A biometric reference Data Object (primitive or constructed) with tags as defined in ISO/IEC 7816-11, representing the CBEFF Biometric Data Block (BDB);
- Payload as the content of an optional Data Object with tag 53_{Hex} or 73_{Hex} as defined in ISO/IEC 7816-6.

The use of the data structure shown in Table 6 is not restricted to smartcards. The data structure may also be used in other types of cards, e.g. magnetic stripe cards, optical memory cards or cards with 2-dimensional barcodes.

Table 6 — The Biometric Information Template used for off-card biometric comparison

Tag	Length	Value				Presence	
7F60 _{Hex}	var.	Biometric Information Template (BIT)					
		Tag	Length	Value			
		A1 _{Hex}	var.	Biometric Header Template (BHT) Tag allocation authority: ISO/IEC JTC 1/SC 37		Mandatory	
				Tag	Length	Value	
				80 _{Hex}	2	CBEFF_patron_header_version (default '0101')	Mandatory (if absent, the default value applies)
				81 _{Hex}	1-3	CBEFF_BDB_biometric_type, see Table 7 .	Optional
				82 _{Hex}	1	CBEFF_BDB_biometric_subtype, see Table 8 .	Optional, use together with biometric type only
				83 _{Hex}	7	CBEFF_BDB_creation_date, creation date and time of biometric reference data: fourteen BCD digits (YYYYMMDDHHMMSS)	Optional
				84 _{Hex}	var.	CBEFF_BIR_creator	Optional
				85 _{Hex}	8	CBEFF_BDB_validity_period, a pair of dates (not before, not after): sixteen BCD digits (YYYYMMDD-DYYYYMMDD)	Optional
				86 _{Hex}	4	CBEFF_BDB_product_owner, CBEFF_BDB_product_type. Concatenation of product owner and product type, identifying the product that created the biometric reference data	Optional
				87 _{Hex}	2	CBEFF_BDB_format_owner, format owner of the biometric reference data, value assigned by the biometrics registration authority	Mandatory
				88 _{Hex}	2	CBEFF_BDB_format_type, format type of biometric reference data, specified by format owner	Mandatory
				90 _{Hex}	var.	CBEFF_BIR_index, unique identifier used for referencing this biometric data set in an application context outside the card	Optional
		5F2E _{Hex} / 7F2E _{Hex}	var.	CBEFF BDB, biometric reference data (primitive / constructed); see note		Mandatory	
		53 _{Hex} / 73 _{Hex}	var.	CBEFF_BIR_payload, optional data for payload (primitive / constructed)		Optional	

NOTE: The structure of the biometric reference data in the case of constructed allows the integration of a biometric challenge for user prompting (e.g. a phrase to be spoken) and a concatenation of biometric data with standardized and proprietary structure. The respective Data Objects are specified in ISO/IEC 7816-11.

11.12 The Group BIT Data Object

Several BITs may be nested in a group BIT (tag '7F61' as defined in ISO/IEC 7816-11). The construction and use of group BIT Data Objects both for on-card and off-card biometric comparison are specified in ISO/IEC 7816-11.

11.13 Abstract values and encodings for biometric type and subtype

Table 7 — CBEFF_BDB_biometric_type abstract values and encodings

Abstract value name	Value encoding	Subtype applies
NO VALUE AVAILABLE	000000 _{Hex}	
Multiple biometric types	01 _{Hex}	
Face	02 _{Hex}	
Voice	04 _{Hex}	
Finger	08 _{Hex}	×
Iris	10 _{Hex}	×
Retina	20 _{Hex}	×
Hand GEOMETRY	40 _{Hex}	×
Signature/Sign	80 _{Hex}	
Keystroke	0100 _{Hex}	
Lip Movement	0200 _{Hex}	
Thermal Face	0400 _{Hex}	
Thermal Hand	0800 _{Hex}	×
Gait	1000 _{Hex}	
Body Odor	2000 _{Hex}	
DNA	4000 _{Hex}	
Ear	8000 _{Hex}	×
FINGER GEOMETRY	010000 _{Hex}	×
PALM GEOMETRY	020000 _{Hex}	×
VEIN PATTERN	040000 _{Hex}	×
FOOT PRINT	080000 _{Hex}	×
NOTE Only the least significant bytes (omitting leading zeros) may become part of the Header Template.		

An example on the use of this patron format can be found in ISO/IEC 24787.

12 Patron format specification: complex patron format (deprecated)

ISO/IEC JTC 1/SC 37

This patron format is considered deprecated. Therefore it shall not be used in new developments or deployments.

257 (0101_{Hex}). The Biometric Registration Authority has allocated this identifier for ISO/IEC JTC 1/SC 37.

ISO/IEC JTC 1/SC 37 complex patron format.

12.4 Patron format type

6 (0006_{Hex}). This has been registered in accordance with ISO/IEC 19785-2.

12.5 ASN.1 object identifier for this patron format

```
{iso registration-authority cbeff(19785) biometric-organization(0) jtc1-
sc37(257) patron-format(1) complex(6)}
```

or, in XML value notation,

```
<OBJECT_IDENTIFIER>1.1.19785.0.257.1.6</OBJECT_IDENTIFIER>
```

12.6 Domain of use

This clause provides a definition of a patron format that may be of general utility to applications that need to carry one or more BIRs (of either the same or different patron formats) in a single complex BIR structure, with explicit identification of the patron format(s) being used.

12.7 Version identifier

This patron format specification has a version identifier of **1**.

12.8 CBEFF version

This specification conforms to CBEFF version (major 2, minor 0).

12.9 General

12.9.1 This patron format supports all the mandatory and optional data elements specified in ISO/IEC 19785-1 except the following ones: capture device owner and identifier, feature extraction algorithm owner and identifier, biometric comparison algorithm owner and identifier, quality algorithm owner and identifier, and compression algorithm owner and identifier. It can support either a simple BIR or a complex BIR structure where each intermediate node or leaf of the structure is itself a BIR (called a “child BIR”) and can be represented in any patron format.

12.9.2 The patron format of each child BIR is explicitly identified in its parent by a pair: patron format owner / patron format type, and can be either this patron format (in which case the child BIR may itself have children), or a different patron format (in which case the child BIR is considered a leaf of this patron format although it may be a complex BIR in its own regard).

12.9.3 Most fields in this patron format are optional. The presence of each optional field is encoded as a single bit of a 24-bit field (“fieldPresence”) at the beginning of the format, which has one bit for each optional field defined in the patron format. The bit value ‘1’ in a given position of that field means that the corresponding field is present in the BIR instance.

12.9.4 All character strings and octet strings are preceded by a length prefix, which can be one, two, or four octets long, as specified for each field.

12.9.5 All integer values, including lengths, are encoded in big-endian order.

12.9.6 Dates and date intervals are encoded as character strings in a way conforming to ISO 8601.

12.9.7 An instance of a BIR or child BIR contains either a BDB or one or more BIR children, but never contains both.

12.10 Specification

An instance of a BIR shall contain the fields specified below, in exactly the same order and with no gaps between the fields.

CBEFF data element name	Field name	Length and optionality ^a	Abstract values and Encodings ^b
<i>The following fields shall occur at most once</i>			
CBEFF_patron_header_version	patronHeaderVersion	1, mandatory	1
CBEFF_version	cbeffVersion	1, mandatory	Major '2' and Minor '0': X'20' (32)
<i>not a standard CBEFF data element</i>	fieldPresence	3, mandatory	A 24-bit field containing one bit for each optional field in the patron format. The bit value '1' means that the corresponding field is present in the BIR instance. Bit position (1=most significant, 24=least significant) and corresponding optional field: 1 bdbFormat Owner & Type 2 bdbEncryption 3 bdbBiometricType 4 bdbBiometricSubtype 5 bdbChallengeResponse 6 bdbCreationDate 7 bdbIndex 8 bdbProcessedLevel 9 bdbProduct Owner & Type 10 bdbPurpose 11 bdbQuality 12 bdbValidityPeriod 13 birCreationDate 14 birCreator 15 birIndex 16 birPayload 17 birValidityPeriod 18 sbFormat Owner & Type 19 bdb 20 sb 21..24 not used (shall be '0')
CBEFF_BDB_format_owner	bdbFormatOwner	2, mandatory if a BDB is present, optional if a BDB is not present.	0..65535
CBEFF_BDB_format_type	bdbFormatType	2, mandatory if a BDB is present, optional if a BDB is not present.	0..65535

CBEFF data element name	Field name	Length and optionality ^a	Abstract values and Encodings ^b
CBEFF_BDB_encryption_options	bdbEncryption	1; mandatory if a BDB is present, otherwise required to be absent.	NO ENCRYPTION: 0 ENCRYPTION: 1
CBEFF_BIR_integrity_options	birIntegrity	1, mandatory	NO INTEGRITY: 0 INTEGRITY: 1
CBEFF_BDB_biometric_type	bdbBiometricType	3	<i>This encoding is a 3 octet bitmap. NO VALUE AVAILABLE is encoded as all 0 bits. If MULTIPLE BIOMETRIC TYPES is set, other bits may also be set to enumerate the types contained in the BDB.</i> NO VALUE AVAILABLE: 000000_{Hex} MULTIPLE BIOMETRIC TYPES: 000001_{Hex} FACE: 000002_{Hex} VOICE: 000004_{Hex} FINGER: 000008_{Hex} IRIS: 000010_{Hex} RETINA: 000020_{Hex} HAND GEOMETRY: 000040_{Hex} SIGNATURE OR SIGN: 000080_{Hex} KEYSTROKE: 000100_{Hex} LIP MOVEMENT: 000200_{Hex} GAIT: 001000_{Hex} VEIN: 002000_{Hex} DNA: 004000_{Hex} EAR: 008000_{Hex} FOOT: 010000_{Hex} SCENT: 020000_{Hex}
CBEFF_BDB_biometric_subtype	bdbBiometricSubtype	1	<i>This encoding is a 1 octet bitmap.</i> <i>Combinations of abstract values are permitted (by ORing the encodings for those values) when the abstract value encoded in CBEFF_BDB_biometric_type represents a biometric technology that can create a BDB where multiple subtypes are supported.</i> NO VALUE AVAILABLE: b'0000 0000' LEFT: b'0000 0001' RIGHT: b'0000 0010' LEFT THUMB: b'0000 0101' LEFT INDEX FINGER: b'0000 1001' LEFT MIDDLE FINGER: b'0001 0001' LEFT RING FINGER: b'0010 0001'

CBEFF data element name	Field name	Length and optionality ^a	Abstract values and Encodings ^b
			LEFT LITTLE FINGER: b'0100 0001' RIGHT THUMB: b'0000 0110' RIGHT INDEX FINGER: b'0000 1010' RIGHT MIDDLE FINGER: b'0001 0010' RIGHT RING FINGER: b'0010 0010' RIGHT LITTLE FINGER: b'0100 0010' LEFT PALM: b'1000 0101' LEFT BACK OF HAND: b'1000 1001' LEFT WRIST: b'1001 0001' RIGHT PALM: b'1000 0110' RIGHT BACK OF HAND: b'1000 1010' RIGHT WRIST: b'1001 0010'
CBEFF_BDB_challenge_response	bdbChallengeResponse	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets).
CBEFF_BDB_creation_date	bdbCreationDate	1 + 8..15	Variable-length ASCII character string, preceded by an 8-bit integer field containing the length (characters). The string shall represent a date (or date and a time of the day) ^c .
CBEFF_BDB_index	bdbIndex	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets). Shall not appear in any BIR in which numChildren is not x'00'.
CBEFF_BDB_processed_level	bdbProcessedLevel	1	RAW: 1 INTERMEDIATE: 2 PROCESSED: 3
CBEFF_BDB_product_owner	bdbProductOwner	2	1..65535
CBEFF_BDB_product_type	bdbProductType	2	1..65535
CBEFF_BDB_purpose	bdbPurpose	1	VERIFY: 1 IDENTIFY: 2 ENROLL: 3 ENROLL FOR VERIFICATION ONLY: 4 ENROLL FOR IDENTIFICATION ONLY: 5 AUDIT: 6
CBEFF_BDB_quality	bdbQuality	1	QUALITY NOT SUPPORTED BY BDB CREATOR: 255 QUALITY SUPPORTED BY BDB CREATOR BUT NOT SET: 254 INTEGER VALUE: 0 – 100
CBEFF_BDB_validity_period	bdbValidityPeriod	1 + 17..31	Variable-length ASCII character string, preceded by an 8-bit integer field containing the length (characters). The string shall represent an interval of two dates (or date and time of the day) ^d .

CBEFF data element name	Field name	Length and optionality ^a	Abstract values and Encodings ^b
CBEFF_BIR_creation_date	birCreationDate	1 + 8..15	Variable-length ASCII character string, preceded by an 8-bit integer field containing the length (characters). The string shall represent a date (or date and a time of the day) ^c .
CBEFF_BIR_creator	birCreator	2 + 0..65535	Variable-length ISO/IEC 10646 character string, encoded in UTF-8, and preceded by a 16-bit integer field containing the length of the UTF-8 encoding (octets).
CBEFF_BIR_index	birIndex	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets). Shall not inherit its value from any other level BIR.
CBEFF_BIR_payload	birPayload	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets). Shall not inherit its value from any other level BIR.
CBEFF_BIR_validity_period	birValidityPeriod	1 + 17..31	Variable-length ASCII character string, preceded by an 8-bit integer field containing the length (characters). The string shall represent an interval of two dates (or date and time of the day) ^d .
CBEFF_SB_format_owner	sbFormatOwner	2	1..65535
CBEFF_SB_format_type	sbFormatType	2	1..65535
BDB	bdb	4 + 0..4294967295	Variable-length octet string, preceded by a 32-bit integer field containing the length (octets). If this field is present in a BIR instance (as indicated in bit 19 of the field <i>field-Presence</i>), then no child BIRs shall be included (<i>numChildren</i> shall have the value 0). Otherwise, at least one child BIR shall be included (<i>numChildren</i> shall have a value greater than 0). NOTE - The content and encoding of the BDB are not specified by CBEFF nor by this patron format specification.
CBEFF_subheader_count	numChildren	1, mandatory	0..255
<i>The following 3 fields shall occur as a group as many times as specified in the field numChildren (0..255)</i>			
CBEFF_BIR_patron_format_owner	childBirPatronFormatOwner	2, mandatory if no BDB is present, otherwise required to be absent.	1..65535

CBEFF data element name	Field name	Length and optionality ^a	Abstract values and Encodings ^b
CBEFF_BIR_patron_format_type	childBirPatronFormatType	2, mandatory if no BDB is present, otherwise required to be absent.	1..65535
<i>not a standard CBEFF data element</i>	childBir	4 + 0..4294967295, mandatory if no BDB is present, otherwise required to be absent.	Variable-length octet string, preceded by a 32-bit integer field containing the length (octets) ^c .
<i>The following field shall occur at most once</i>			
SB	sb	4 + 0..4294967295	Variable-length octet string, preceded by a 32-bit integer field containing the length (octets).
^a The date shall be represented in the ISO 8601 basic format YYYYMMDDTHHMMSS, where the last 2, the last 4, or the last 7 characters may be omitted. Examples: 20050103, 20050106T11, 20050106T1230, and 20050106T145504. ^b Each date shall be represented in the ISO 8601 basic format YYYYMMDDTHHMMSS, where the last 2, the last 4, or the last 7 characters may be omitted. The two dates shall be separated by a SOLIDUS ("/") character, and shall have the same number of digits. Examples: 20050103/20060103, 20050106T11/20050306T11, and 20050106T113300/20050306T113259. ^c A BIR consists of either: 1) an SBH, BDB, optional SB, and numChildren value of zero, or 2) an SBH, no BDB, and numChildren value greater than zero.			

12.11 Illustrative examples

Table 9 — “Simple” BIR (one BDB)

Field Name	Length	Abstract Value	Encoding
patronHeaderVersion	1	1	01 _{Hex}
cbeffVersion	1	Major 2, Minor 0	20 _{Hex}
fieldPresence	3	bdbFormatOwner and Type bdbEncryption bdbBiometricType bdbQuality bdb	E02020 _{Hex}
bdbFormatOwner	2	ISO/IEC JTC 1/SC 37	257 (0101 _{Hex})
bdbFormatType	2	Face image	0008 _{Hex}
bdbEncryption	1	NO ENCRYPTION	00 _{Hex}
birIntegrity	1	NO INTEGRITY	00 _{Hex}
bdbBiometricType	3	FACE-IMAGE	400000 _{Hex}
bdbQuality	1	75/100	4B _{Hex}
bdb	4 + 4096	octet string	00001000 _{Hex} + 4096 octets
numChildren	1	zero	00 _{Hex}

Table 10 — Complex BIR fields and abstract values corresponding to Figure 2 in ISO/IEC 19785-1

1. patronHeaderVersion = 1 *(beginning of the root header BIR)*
2. cbeffVersion = 2:0
3. fieldPresence = sbFormatOwner/Type
4. birIntegrity = INTEGRITY *(integrity is applied to the entire complex BIR via the SB on line 90)*
5. sbFormatOwner = a security vendor
6. sbFormatType = that vendor's security block format *(see the final SB on line 90)*
7. numChildren = 2
8. childBirPatronFormatOwner = SC 37
9. childBirPatronFormatType = 8 *(this format)*
10. ► *(denotes the beginning of the next BIR)*
11. patronHeaderVersion = 1
12. cbeffVersion = 2:0
13. fieldPresence = bdbBiometricType
14. birIntegrity = NO INTEGRITY
15. bdbBiometricType = FINGER *(the next 3 BIRs inherit this value)*
16. numChildren = 3
17. childBirPatronFormatOwner = SC 37
18. childBirPatronFormatType = 8 *(this format)*
19. ►
20. patronHeaderVersion = 1
21. cbeffVersion = 2:0
22. fieldPresence = bdbFormatOwner/Type;
bdbEncryption; bdbBiometricSubtype; bdb
23. bdbFormatOwner = SC 37
24. bdbFormatType = a standardized BDB format
25. bdbEncryption = NO ENCRYPTION
26. birIntegrity = NO INTEGRITY
27. bdbBiometricSubtype = LEFT INDEX FINGER

- 28. bdb
- 29. numChildren=0
- 30. ▶
- 31. patronHeaderVersion = 1
- 32. cbeffVersion = 2:0
- 33. fieldPresence = bdbFormatOwner/Type;
bdbEncryption; bdbBiometricSubtype; bdb
- 34. bdbFormatOwner = *vendor ABC*
- 35. bdbFormatType = *non standard BDB for-*
mat A
- 36. bdbEncryption = NO ENCRYPTION
- 37. birIntegrity = NO INTEGRITY
- 38. bdbBiometricSubtype = LEFT MIDDLE
FINGER
- 39. bdb
- 40. numChildren=0
- 41. ▶
- 42. patronHeaderVersion = 1
- 43. cbeffVersion = 2:0
- 44. fieldPresence = bdbFormatOwner/Type;
bdbEncryption; bdbBiometricSubtype; bdb
- 45. bdbFormatOwner = *vendor XYZ*
- 46. bdbFormatType = *non standard BDB for-*
mat B
- 47. bdbEncryption = NO ENCRYPTION
- 48. birIntegrity = NO INTEGRITY
- 49. bdbBiometricSubtype = LEFT RING FIN-
GER
- 50. bdb
- 51. numChildren=0
- 52. ▶
- 53. patronHeaderVersion = 1
- 54. cbeffVersion = 2:0

55. fieldPresence = bdbBiometricType
56. birIntegrity = NO INTEGRITY
57. bdbBiometricType = IRIS *(the next 2 BIRs inherit this type)*
58. numChildren = 2
59. childBirPatronFormatOwner = SC 37
60. childBirPatronFormatType = 8 *(this format)*
61. ►
62. patronHeaderVersion = 1
63. cbeffVersion = 2:0
64. fieldPresence = bdbFormatOwner/Type;
bdbEncryption; bdbBiometricSubtype;
sbFormatOwner/Type; bdb; sb
65. bdbFormatOwner = SC 37
66. bdbFormatType = *an iris format*
67. bdbEncryption = ENCRYPTION
68. birIntegrity = NO INTEGRITY
69. bdbBiometricSubtype = LEFT
70. sbFormatOwner = *an encryption vendor*
71. sbFormatType = *a security block format* *(see SB on line 74)*
72. bdb
73. numChildren=0
74. sb *(see SB format identifier on lines 70-71)*
75. ►
76. patronHeaderVersion = 1
77. cbeffVersion = 2:0
78. fieldPresence = bdbFormatOwner/Type;
bdbEncryption; bdbBiometricSubtype;
sbFormatOwner/Type; bdb; sb
79. bdbFormatOwner = *vendor PQR*
80. bdbFormatType = *vendor's format C*
81. bdbEncryption = ENCRYPTION
82. birIntegrity = NO INTEGRITY
83. bdbBiometricSubtype = RIGHT

84. sbFormatOwner = *an encryption vendor*
85. sbFormatType = *a security block format* (see SB on line 88)
86. bdb
87. numChildren=0
88. sb (see SB format identifier on lines 84-85)
89. ►
90. sb (see SB format identifier in root header on line 6)

Table 11 — BIR wrapped in an enveloping BIR

Field Name	Length	Abstract Value	Encoding
patronHeaderVersion	1	1	01 _{Hex}
cbeffVersion	1	Major 2, Minor 0	20 _{Hex}
fieldPresence	3	all optional fields absent in the enveloping BIR	000000 _{Hex}
birIntegrity	1	NO INTEGRITY	00 _{Hex}
numChildren	1	one child (<i>the enveloped BIR</i>)	01 _{Hex}
childBirPatronFormatOwner)	2	patron format owner of the enveloped BIR	<i>variable</i>
childBirPatronFormatType	2	patron format type of the enveloped BIR	<i>variable</i>
childBir (length of the child BIR)	4	length of the enveloped BIR	<i>variable</i>
childBir (octets of the child BIR)	<i>variable</i>	octets of the enveloped BIR	<i>variable</i>

Table 11 shows how the Complex patron format specified in this clause can be used as a simple envelope around a BIR of an arbitrary patron format in order to provide identification of its format and specify its length. When using the Complex patron format in this way, the portion of the enveloping BIR preceding the enveloped BIR can be thought of as a fixed-length prefix to the enveloped BIR. Since all the optional fields of the enveloping BIR are absent, the length of the prefix is only 15 octets, given by:

- 7 octets with the fixed values x'01 20 00 00 00 00 01'; plus
- 4 octets containing the patron format owner and type of the enveloped BIR; plus
- 4 octets containing the length of the enveloped BIR.

12.12 ASN.1 definition (provided for illustrative purposes only)

The following ASN.1 specification provides an abstract description of the patron format, and may be useful to some readers of this part of ISO/IEC 19785. It is not intended to provide an alternative specification of the encodings of this patron format.

```
CBEFF-COMPLEX-PATRON-FORMAT
{iso standard 19785 modules(0) complex-BIR(10)}
DEFINITIONS
```

AUTOMATIC TAGS ::=
 BEGIN

```

BIR ::= SEQUENCE {
  patronHeaderVersion INTEGER(0..255),
  cbeffVersion INTEGER(0..255),

  fieldPresence SEQUENCE {
    bdbFormat BOOLEAN,
    bdbEncryption BOOLEAN,
    bdbBiometricType BOOLEAN,
    bdbBiometricSubtype BOOLEAN,
    bdbChallengeResponse BOOLEAN,
    bdbCreationDate BOOLEAN,
    bdbIndex BOOLEAN,
    bdbProcessedLevel BOOLEAN,
    bdbProduct BOOLEAN,
    bdbPurpose BOOLEAN,
    bdbQuality BOOLEAN,
    bdbValidityPeriod BOOLEAN,
    birCreationDate BOOLEAN,
    birCreator BOOLEAN,
    birIndex BOOLEAN,
    birValidityPeriod BOOLEAN,
    sbFormat BOOLEAN,
    bdb BOOLEAN,
    children BOOLEAN,
    sb BOOLEAN
  },

  bdbFormat SEQUENCE {
    bdbFormatOwner INTEGER(0..65535),
    bdbFormatType INTEGER(0..65535)
  } OPTIONAL,

  bdbEncryption INTEGER(0..255) OPTIONAL,
  birIntegrity INTEGER(0..255),
  bdbBiometricType INTEGER(0..16777215) OPTIONAL,
  bdbBiometricSubtype INTEGER(0..255) OPTIONAL,
  bdbChallengeResponse OCTET STRING (SIZE(0..65535)) OPTIONAL,
  bdbCreationDate OCTET STRING (SIZE(8..15)) OPTIONAL,
  bdbIndex OCTET STRING (SIZE(0..65535)) OPTIONAL,
  bdbProcessedLevel INTEGER(0..255) OPTIONAL,

  bdbProduct SEQUENCE {
    bdbProductOwner INTEGER(0..65535),
    bdbProductType INTEGER(0..65535)
  } OPTIONAL,

  bdbPurpose INTEGER(0..255) OPTIONAL,
  bdbQuality INTEGER(0..255) OPTIONAL,
  bdbValidityPeriod OCTET STRING (SIZE(15..31)) OPTIONAL,
  birCreationDate OCTET STRING (SIZE(8..15)) OPTIONAL,
  birCreator OCTET STRING (SIZE(0..65535)) OPTIONAL,
  birIndex OCTET STRING (SIZE(0..65535)) OPTIONAL,
  birPayload OCTET STRING (SIZE(0..65535)) OPTIONAL,
  birValidityPeriod OCTET STRING (SIZE(15..31)) OPTIONAL,

  sbFormat SEQUENCE {
    sbFormatOwner INTEGER(0..65535),
    sbFormatType INTEGER(0..65535)
  } OPTIONAL,

  bdb OCTET STRING (SIZE(0..4294967295)) OPTIONAL,

  children SEQUENCE (SIZE(0..255)) OF
    child SEQUENCE {
      childBirPatronFormat SEQUENCE {
        childBirPatronFormatOwner INTEGER(0..65535),
        childBirPatronFormatType INTEGER(0..65535)
      },

```

```
        childBir OCTET STRING (SIZE(0..4294967295))
    }
    'sb OCTET STRING (SIZE(0..4294967295)) OPTIONAL
}
END
```

13 Patron format specification: XML patron format (with additional data elements)

13.1 Patron

ISO/IEC JTC 1/SC 37

13.2 Patron format owner

257 (0101_{Hex}). The Biometric Registration Authority has allocated this identifier for ISO/IEC JTC 1/SC 37.

13.3 Patron format name

ISO/IEC JTC 1/SC 37 XML patron format.

13.4 Patron format type

11 (000B_{Hex}). This has been registered in accordance with ISO/IEC 19785-2.

13.5 ASN.1 object identifier for this patron format

{iso registration-authority cbeff(19785) biometric-organization(0) jtc1-sc37(257) patron-format(1) xml-full(7)}

or, in XML value notation,

<OBJECT_IDENTIFIER>1.1.19785.0.257.1.7</OBJECT_IDENTIFIER>

13.6 Domain of use

This clause specifies a patron format based on XML that may be of general utility to applications that need to carry one or more BIRs in a simple or complex BIR structure and benefit from the use of XML over a binary format.

13.7 Version identifier

This patron format specification has a version identifier of (major 2, minor 0).

NOTE Clauses 13 and 15 in ISO/IEC 19785-3:2007+A1:2010 were versioned as (major 0, minor 0) and (major 1, minor 0), respectively. Due to the merging of the two clauses, this is now version (major 2, minor 0).

13.8 CBEFF version

This specification conforms to CBEFF version (major 2, minor 0).

13.9 General

13.9.1 This patron format is based on W3C XML 1.0. It supports all the mandatory and optional data elements specified in ISO/IEC 19785-1. It can support either a simple BIR or a complex BIR structure where each intermediate node or leaf of the structure is itself a BIR (called a “child BIR”).

13.9.2 Most fields in this patron format are optional. Some mandatory and optional fields are represented by XML elements, others are represented by attributes of XML elements. The presence of an optional field in a BIR is signaled by simply including the corresponding element or attribute, and its absence is signaled by simply omitting the corresponding element or attribute.

13.9.3 Special encodings are specified for integers (see [13.26](#)), octet strings (see [13.27](#)), and date and time-of-the-day abstract values (see [13.28](#)).

13.9.4 An instance of a BIR or child BIR contains either a BDB or one or more BIR children, but never contains both.

13.9.5 An extension mechanism is specified, which enables the inclusion of application-specific data (not standardized) within a BIR or child BIR (see [13.11.1.6](#)).

13.10 Specification

13.10.1 In the rest of this clause, the terms “element” and “attribute” are used with the meaning of “XML element” and “XML attribute”, respectively.

13.10.2 The namespace with the name “<http://standards.iso.org/iso-iec/19785/-3/ed-2/>” is called the patron format namespace of this patron format. This namespace name corresponds to the following ASN.1 object identifier:

```
{iso registration-authority cbeff(19785) biometric-organization(0) jtc1-sc37(257) patron-format(1) xml(7) namespace(0)}
```

13.10.3 All elements defined in this patron format have the patron format namespace name. All attribute names are unqualified.

13.10.4 An instance of a BIR shall be represented as a <BIR> element (see [13.11](#)).

13.10.5 The <BIR> element may be the root of an XML document, but this is not required.

13.10.6 The portion of the XML document consisting of the <BIR> element and its whole content shall be valid according to the XML schema provided in [13.31](#).

NOTE 1 Validity according to that XML schema does not imply that the <BIR> element satisfies all the requirements in the normative text of this specification, as there are some requirements that cannot be (or are not) formally expressed in the XML schema.

NOTE 2 When the <BIR> element is the root of an XML document, the UTF-8 character encoding is recommended for the XML document, because it will usually produce a smaller encoding.

13.10.7 The abstract value NO VALUE AVAILABLE, for any CBEFF data element that supports this abstract value, shall be encoded as the omission of the corresponding element or attribute both in the <BIR> element and in all of its ancestor <BIR> elements.

NOTE The inheritance mechanism specified in [13.14.2.1](#), [13.15.2.1](#) and [13.24.2.1](#) causes a data element of a BIR to inherit an abstract value (different from NO VALUE AVAILABLE) from its closest ancestor <BIR> element that contains that element or attribute when the <BIR> element in question does not contain it. If any <BIR> element in a hierarchy of <BIR> elements specifies an abstract value for a given data element, that abstract value can be overridden by a different abstract value in any of its descendant <BIR> elements, but the overriding abstract value can never be NO VALUE AVAILABLE.

13.11 Element <BIR>

13.11.1 Syntax

13.11.1.1 This element shall have no attributes, and shall have a content consisting of the following (in order):

- a) an optional <Version> element (see [13.12](#));
- b) an optional <CBEFFVersion> element (see [13.13](#));
- c) zero or more application-specific elements;
- d) a mandatory <BIRInfo> element (see [13.14](#));
- e) an optional <BDBInfo> element (see [13.15](#));
- f) an optional <SBInfo> element (see [13.24](#));
- g) zero or more <BIR> elements (see [13.11](#));
- h) either an optional <BDB> element that shall contain a valid representation of an octet string (see [13.27](#)), or an optional <bdbX> element that shall contain a valid XML string;
- i) an optional <SB> element – the content of this element shall be a valid representation of an octet string. (see [13.27](#)).

13.11.1.2 The <BDB> or <bdbX> element shall not be present if one or more child <BIR> elements are present, and shall be present if no child <BIR> elements are present.

13.11.1.3 The <SB> element shall be absent unless its presence is required by [13.14.2.2](#) or permitted by [13.15.2.3](#).

13.11.1.4 If the <BDB> or <bdbX> element is present, then the <BDBInfo> element shall also be present.

13.11.1.5 If the <SB> element is present, then the <SBInfo> element shall also be present.

13.11.1.6 The number of application-specific elements and their name, namespace name, attributes, and content are not defined in this patron format specification. However, the namespace name of those elements shall be different from the patron format namespace name (see [13.10.2](#)).

13.11.2 Semantics

13.11.2.1 This element is either a complex or a simple BIR, depending on which child elements are present. If a child <BDB> or <bdbX> element is present, this element is a simple BIR. If one or more child <BIR> elements are present, this element is a complex BIR.

13.11.2.2 The elements <Version>, <CBEFFVersion>, <BIRInfo>, <BDBInfo>, and <SBInfo> and their content form the standard biometric header of the BIR.

13.11.2.3 The <Version> element (if present) carries the major and minor version number of this patron format.

13.11.2.4 The <CBEFFVersion> element (if present) carries the major and minor version number of the CBEFF standard.

13.11.2.5 Each <BIR> element is a whole BIR (of the same patron format) that is a child BIR of the BIR.

13.11.2.6 The <BDB> or <bdbX> element (if present) carries the biometric data block (BDB) of the BIR.

NOTE A <BDB> or <bdbX> element and a <BIR> element cannot coexist as children of the same <BIR> element (see [13.11.1.2](#)).

13.11.2.7 The <SB> element (if present) carries the security block (SB) of the BIR.

NOTE A <SB> element can coexist with either a <BIR> element or a <BDB> or <bdbX> element that is a child of the same <BIR> element.

13.11.2.8 The <BIRInfo> element carries information about both the BIR and (possibly) about its descendant BIRs (if the <BIR> element has one or more child <BIR> elements), as specified in [13.14.2.1](#).

13.11.2.9 The <BDBInfo> element (if present) carries information about either the BDB of the BIR (if the <BIR> element has a child <BDB> or <bdbX> element) or about the BDBs of the descendant BIRs that have a child <BDB> or <bdbX> element (if the <BIR> element has one or more child <BIR> elements), as specified in [13.15.2.1](#).

13.11.2.10 The <SBInfo> element (if present) carries information about either the SB of the BIR (if the <BIR> element has a child <SB> element) or about the SBs of the descendant BIRs that have a child <SB> element (if the <BIR> element has one or more child <BIR> elements but no child <SB> element), as specified in [13.24.2.1](#).

13.12 Element <Version>

13.12.1 Syntax

This element shall have contents consisting of the following (in order):

- a) a required <Major> element – the value of this element shall be a valid representation of an integer in the range 0 to 15 (see [13.26](#));
- b) a required <Minor> element – the value of this element shall be a valid representation of an integer in the range 0 to 15 (see [13.26](#)).

13.12.2 Semantics

13.12.2.1 This element represents the data element CBEFF_patron_header_version, and carries the (major and minor) version number of the patron format. The number assigned to this version of the patron format is major 0, minor 0.

13.12.2.2 The <Major> element represents the major version number (2 in this version).

13.12.2.3 The <Minor> element represents the minor version number (0 in this version).

13.12.2.4 If this element is not present, the values Major="2" Minor="0" are implied.

13.12.2.5 A child <BIR> element shall have the same (major and minor) version number as its parent <BIR> element.

NOTE This implies that the <Version> element, if present in a child <BIR> element, has to carry the same values as the <Version> element in the parent <BIR> element. This is equivalent to omitting the <Version> element. Therefore, this element is normally omitted in child <BIR> elements.

13.13 Element <CBEFFVersion>

13.13.1 Syntax

This element shall have content consisting of the following (in order):

- a) a required <Major> element – the value of this element shall be a valid representation of an integer in the range 0 to 15 (see [13.26](#));
- b) a required <Minor> element – the value of this element shall be a valid representation of an integer in the range 0 to 15 (see [13.26](#)).

13.13.2 Semantics

13.13.2.1 This element represents the data element CBEFF_version, and carries the version number of the CBEFF standard supported by this patron format. The number assigned to the version of CBEFF supported by this patron format is Major=2, Minor=0.

13.13.2.2 The <Major> element represents the major version number (2 in this version).

13.13.2.3 The <Minor> element represents the minor version number (0 in this version).

13.13.2.4 If this element is not present, the values Major="2" Minor="0" are implied.

13.13.2.5 A child <BIR> element shall have the same CBEFF version number (major and minor) as its parent <BIR> element.

NOTE Thus, the <CBEFFVersion> element is normally omitted from all child <BIR> elements, as it would be redundant.

13.14 Element <BIRInfo>

13.14.1 Syntax

13.14.1.1 This element shall have a content consisting of the following (in order):

- a) an optional <Creator> element – the content of this element shall be a string of ISO/IEC 10646 characters;
- b) an optional <Index> element – the content of this element shall be a valid representation of a universally unique identifier (see [13.29](#)), and shall not inherit its value from any other level BIR;
- c) an optional <Payload> element – the content of this element shall be a valid representation of an octet string, and shall not inherit its value from any other level BIR.
- d) a required <Integrity> element – the value of this element shall be one of the character strings in the third cell of the corresponding row of [Table 12](#);
- e) an optional <CreationDate> element – the value of this element shall be a valid representation of a date and time of the day (see [13.28](#));
- f) an optional <NotValidBefore> element – the value of this element shall be a valid representation of a date and time of the day (see [13.28](#));

- g) an optional `<NotValidAfter>` element – the value of this element shall be a valid representation of a date and time of the day (see [13.28](#)).

13.14.2 Semantics

13.14.2.1 The `<BIRInfo>` element carries information about the BIR. In addition, if the BIR has one or more child BIRs (the `<BIR>` element has one or more child `<BIR>` elements), the information carried by the attributes and child elements of the `<BIRInfo>` element is inherited by those child BIRs except where overridden by a corresponding attribute or child element of the `<BIRInfo>` element of a child BIR. The information inherited by a BIR applies to that BIR, and (if the BIR has itself child BIRs) is further inherited by its child BIRs in the same way (and so on recursively).

NOTE Since the `Integrity` element is required and the `<BIRInfo>` element is mandatory in all `<BIR>` elements, inheritance of the `Integrity` element can never occur.

13.14.2.2 The `Integrity` element indicates whether integrity information about this BIR is provided within the security block (SB) of the BIR (the child `<SB>` element of the parent `<BIR>` element of this `<BIRInfo>` element).

NOTE This information may consist of a digital signature or MAC, a reference to a key or certificate, an encrypted key (with or without a reference to the key used to encrypt that key), or other parameters of the digital signing (or MAC) process.

13.14.2.3 If the value of the `<Integrity>` element is "true", then the parent `<BIR>` element of this `<BIRInfo>` element shall have a child `<SB>` element.

13.14.2.4 [Table 12](#) specifies the correspondence between the attributes and child elements of this element and CBEFF data elements, and specifies the supported abstract values and their encodings (see also [13.10.7](#)).

NOTE This element represents all CBEFF data elements whose name begins with "CBEFF_BIR_".

Table 12 — BIR information

CBEFF data element name	XML element	Supported abstract values and encodings
CBEFF_BIR_creator	<code><Creator></code>	All ISO/IEC 10646 character strings are supported. The character string shall be encoded as the string itself.
CBEFF_BIR_index	<code><Index></code>	All well-formed UUIDs are supported. The UUIDs shall be encoded as specified in 13.29 . Shall not inherit its value from any other BIR level.
CBEFF_BIR_payload	<code><Payload></code>	All octet strings are supported. The octet strings shall be encoded as specified in 13.27 . Shall not inherit its value from any other BIR level.
CBEFF_BIR_integrity_options	<code><Integrity></code>	The following abstract values are supported. The abstract values shall be encoded as shown below. NO INTEGRITY: "false" INTEGRITY: "true"
CBEFF_BIR_creation_date	<code><CreationDate></code>	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 13.28 .

Table 12 (continued)

CBEFF data element name	XML element	Supported abstract values and encodings
CBEFF_BIR_validity_period (lower end)	<NotValidBefore>	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 13.28 .
CBEFF_BIR_validity_period (upper end)	<NotValidAfter>	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 13.28 .

13.15 Element <BDBInfo>

13.15.1 Syntax

13.15.1.1 This element shall have a content consisting of the following (in order):

- a) an optional <ChallengeResponse> element – the content of this element shall be a valid representation of an octet string (see [13.27](#));
- b) an optional <Index> element – the content of this element shall be a valid representation of a universally unique identifier (see [13.29](#)).
- c) an optional <Format> element (see [13.16](#));
- d) an optional <Encryption> element – the value of this element shall be one of the character strings in the third cell of the corresponding row of [Table 13](#);
- e) an optional <CreationDate> element – the value of this element shall be a valid representation of a date and time of the day (see [13.28](#));
- f) an optional <NotValidBefore> element – the value of this element shall be a valid representation of a date and time of the day (see [13.28](#));
- g) an optional <NotValidAfter> element – the value of this element shall be a valid representation of a date and time of the day (see [13.28](#));
- h) an optional <Type> element – the value of this element shall be one of the character strings in the third cell of the corresponding row of [Table 13](#);
- i) an optional <Subtype> element – the value of this element shall be one of the character strings in the third cell of the corresponding row of [Table 13](#);
- j) an optional <Level> element – the value of this element shall be one of the character strings in the third cell of the corresponding row of [Table 13](#);
- k) an optional <Product> element (see [13.17](#));
- l) an optional <CaptureDevice> element (see [13.18](#));
- m) an optional <FeatureExtractionAlgorithm> element (see [13.19](#));
- n) an optional <ComparisonAlgorithm> element (see [13.20](#));
- o) an optional <CompressionAlgorithm> element (see [13.21](#));
- p) an optional <Purpose> element – the value of this element shall be one of the character strings in the third cell of the corresponding row of [Table 13](#);
- q) an optional <Quality> element (see [13.22](#)).

13.15.1.3 If the parent <BIR> element has a child <BDB> element, then the <Encryption> element shall be present in this <BDBInfo> element unless it is present in the child <BDBInfo> element of an ancestor <BIR> element (see also [13.11.1.4](#)).

13.15.1.4 If the parent <BIR> element has a child <BDB> element, then the <FormatOwner> element shall be present in this <BDBInfo> element unless it is present in the child <BDBInfo> element of an ancestor <BIR> element (see also [13.11.1.4](#)).

13.15.1.5 If the parent <BIR> element has a child <BDB> element, then the <FormatType> element shall be present in this <BDBInfo> element unless it is present in the child <BDBInfo> element of an ancestor <BIR> element (see also [13.11.1.4](#)).

NOTE The ancestor <BIR> elements mentioned in the last three subclauses above need not be the same.

13.15.2 Semantics

13.15.2.1 If the BIR has a BDB (the <BIR> element has a child <BDB> element), then the <BDBInfo> element carries information about that BDB. Otherwise, the information carried by the attributes and child elements of the <BDBInfo> element is inherited by all the BIRs that are children of the BIR except where overridden by a corresponding attribute or child element of the <BDBInfo> element of a child BIR. The information inherited by a BIR with a BDB applies to that BDB, whereas the information inherited by a BIR that has itself child BIRs is further inherited by all the BIRs that are children of the BIR in the same way (and so on recursively).

13.15.2.2 If the BIR has a BDB and encryption is applied to that BDB (either by including the encryption attribute with the value "true" in the <BDBInfo> element or by having the BIR inherit that attribute value from its parent BIR), then the BDB in the <BDB> element shall be encrypted.

13.15.2.3 If the BDB of a BIR is encrypted, information about the encryption process may be provided within the security block (SB) of that BIR (the child <SB> element of the parent <BIR> element of this <BIRInfo> element).

NOTE This information may consist of a reference to an encryption key, an encrypted key (with or without a reference to the key used to encrypt that key), or other parameters of the encryption process.

13.15.2.4 [Table 13](#) specifies the correspondence between the attributes and child elements of this element and CBEFF data elements, and specifies the supported abstract values and their encodings (see also [13.10.7](#)).

NOTE This element represents all CBEFF data elements whose name begins with "CBEFF_BDB_".

Table 13 — BDB information

CBEFF data element name	XML element	Supported abstract values and encodings
CBEFF_BDB_format	<Format>	See 13.16
CBEFF_BDB_encryption_options	<Encryption>	The following abstract values are supported. The abstract values shall be encoded as shown below. NO ENCRYPTION: "false" ENCRYPTION: "true"
CBEFF_BDB_creation_date	<CreationDate>	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 13.28.
CBEFF_BDB_validity_period (lower end)	<NotValidBefore>	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 13.28.
CBEFF_BDB_index	<Index>	All well-formed UUIDs are supported. The UUIDs shall be encoded as specified in 13.29 Shall appear only in BIRs that have a BDB.
CBEFF_BDB_challenge_response	<ChallengeResponse>	All octet strings are supported. The octet strings shall be encoded as specified in 13.27. Shall appear only in BIRs that have a BDB.
CBEFF_BDB_validity_period (upper end)	<NotValidAfter>	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 13.28.
CBEFF_BDB_biometric_type	<Type>	The following abstract values and all their unordered combinations are supported. A single abstract value shall be encoded as the corresponding string shown below. A combination of two or more abstract values shall be encoded as the concatenation of the corresponding strings, using a single space as separator. SCENT: "Scent"

Table 13 (continued)

CBEFF data element name	XML element	Supported abstract values and encodings
		DNA: "DNA" EAR: "Ear" FACE: "Face" FINGER: "Finger" FOOT: "Foot" VEIN: "Vein" HAND GEOMETRY: "HandGeometry" IRIS: "Iris" RETINA: "Retina" VOICE: "Voice" GAIT: "Gait" KEYSTROKE: "Keystroke" LIP MOVEMENT: "LipMovement" SIGNATURE OR SIGN: "SignatureSign" PALM: "PalM" BACK OF HAND: "BackOfHand" WRIST: "Wrist"
CBEFF_BDB_biometric_subtype	<Subtype>	The following abstract values are supported. The abstract values shall be encoded as shown below. A combination of two or more abstract values shall be encoded as the concatenation of the corresponding strings, using a single space as separator.

Table 13 (continued)

CBEFF data element name	XML element	Supported abstract values and encodings
		LEFT: "Left" RIGHT: "Right" THUMB: "Thumb" INDEX FINGER: "IndexFinger" MIDDLE FINGER: "MiddleFinger" RING FINGER: "RingFinger" LITTLE FINGER: "LittleFinger"
CBEFF_BDB_processed_level	<Level>	The following abstract values are supported. The abstract values shall be encoded as shown below. RAW: "Raw" INTERMEDIATE: "Intermediate" PROCESSED: "Processed"
CBEFF_BDB_product	<Product>	See 13.17
CBEFF_BDB_capture_device	<CaptureDevice>	See 13.18
CBEFF_BDB_feature_extraction_algorithm	<FeatureExtractionAlgorithm>	See 13.19
CBEFF_BDB_comparison_algorithm	<ComparisonAlgorithm>	See 13.20
CBEFF_BDB_compression_algorithm	<CompressionAlgorithm>	See 13.21
CBEFF_BDB_purpose	<Purpose>	The following abstract values are supported. The abstract values shall be encoded as shown below. VERIFY: "Verify" IDENTIFY: "Identify" ENROLL: "Enroll"

Table 13 (continued)

CBEFF data element name	XML element	Supported abstract values and encodings
		ENROLL FOR VERIFICATION ONLY: "EnrollVerify" ENROLL FOR IDENTIFICATION ONLY: "EnrollIdentify" AUDIT: "Audit"
CBEFF_BDB_quality	<Quality>	See 13.22

13.16 Element <Format> of BDBInfoType

13.16.1 Syntax

If present, this element shall have the contents consisting of the following (in order):

- a required <Organization> element – the content of this element shall be a string of ISO/IEC 10646 characters;
- a required <Type> element – the content of this element shall be a string of ISO/IEC 10646 characters.

13.16.2 Semantics

13.16.2.1 This element represents the CBEFF_BDB_format_owner and CBEFF_BDB_format_type data elements, and carries the organization code and type code, respectively, as registered with the Biometric Registry Authority.

13.16.2.2 The <Organization> element represents the organization/owner/vendor code as specified in the registry.

13.16.2.3 The <Type> element represents the type code as specified in the registry.

13.17 Element <Product>

13.17.1 Syntax

If present, this element shall have the contents consisting of the following (in order):

- a required <Organization> element – the content of this element shall be a string of ISO/IEC 10646 characters;
- a required <Type> element – the content of this element shall be a string of ISO/IEC 10646 characters.

13.17.2 Semantics

13.17.2.1 This element represents the CBEFF_BDB_product_owner and CBEFF_BDB_product_type data elements, and carries the organization code and type code, respectively, as registered with the Biometric Registry Authority.

13.17.2.2 The <Organization> element represents the organization/owner/vendor code as specified in the registry.

13.17.2.3 The <Type> element represents the type code as specified in the registry.

13.18 Element <CaptureDevice>

13.18.1 Syntax

If present, this element shall have the contents consisting of the following (in order):

- a) a required <Organization> element – the content of this element shall be a string of ISO/IEC 10646 characters;
- b) a required <Type> element – the content of this element shall be a string of ISO/IEC 10646 characters.

13.18.2 Semantics

13.18.2.1 This element represents the CBEFF_BDB_capture_device_owner and CBEFF_BDB_capture_device_type data elements, and carries the organization code and type code, respectively, as registered with the Biometric Registry Authority.

13.18.2.2 The <Organization> element represents the organization/owner/vendor code as specified in the registry.

13.18.2.3 The <Type> element represents the type code as specified in the registry.

13.19 Element <FeatureExtractionAlgorithm>

13.19.1 Syntax

If present, this element shall have the contents consisting of the following (in order):

- a) a required <Organization> element – the content of this element shall be a string of ISO/IEC 10646 characters;
- b) a required <Type> element – the content of this element shall be a string of ISO/IEC 10646 characters.

13.19.2 Semantics

13.19.2.1 This element represents the CBEFF_BDB_feature_extraction_algorithm_owner and CBEFF_BDB_feature_extraction_algorithm_type data elements, and carries the organization code and type code, respectively, as registered with the Biometric Registry Authority.

13.19.2.2 The <Organization> element represents the organization/owner/vendor code as specified in the registry.

13.19.2.3 The <Type> element represents the type code as specified in the registry.

13.20 Element <ComparisonAlgorithm>

13.20.1 Syntax

If present, this element shall have the contents consisting of the following (in order):

- a) a required <Organization> element – the content of this element shall be a string of ISO/IEC 10646 characters;
- b) a required <Type> element – the content of this element shall be a string of ISO/IEC 10646 characters.

13.20.2 Semantics

13.20.2.1 This element represents the CBEFF_BDB_comparison_algorithm_owner and CBEFF_BDB_comparison_algorithm_type data elements, and carries the organization code and type code, respectively, as registered with the Biometric Registry Authority.

13.20.2.2 The <Organization> element represents the organization/owner/vendor code as specified in the registry.

13.20.2.3 The <Type> element represents the type code as specified in the registry.

13.21 Element <CompressionAlgorithm>

13.21.1 Syntax

If present, this element shall have the contents consisting of the following (in order):

- a) a required <Organization> element – the content of this element shall be a string of ISO/IEC 10646 characters;
- b) a required <Type> element – the content of this element shall be a string of ISO/IEC 10646 characters.

13.21.2 Semantics

13.21.2.1 This element represents the CBEFF_BDB_compression_algorithm_owner and CBEFF_BDB_compression_algorithm_type data elements, and carries the organization code and type code, respectively, as registered with the Biometric Registry Authority.

13.21.2.2 The <Organization> element represents the organization/owner/vendor code as specified in the registry.

13.21.2.3 The <Type> element represents the type code as specified in the registry.

13.22 Element <Quality>

13.22.1 Syntax

If present, this element shall have the contents consisting of the following (in order):

- a) a required <Algorithm> element (see [13.23](#));
- b) either a <Score> element shall be a valid representation of an integer in the range 0 to 100 (see [13.26](#)), or a <QualityCalculationFailed> element if there was an error during the calculation

of a quality score. The <QualityCalculationFailed> element must either be empty or shall be a string of ISO/IEC 10646 characters.

13.22.2 Semantics

13.22.2.1 The <Score> element, if present, represents the CBEFF_BDB_quality data element and carries an integer score in the range of 0 to 100 specifying the quality score calculated by a biometric system.

13.22.2.2 The <QualityCalculatedFailed> element, if present, denotes that the quality calculation was unsuccessful for some reason. This element can either be empty or carry a message of why the calculation failed.

13.23 Element <Algorithm>

13.23.1 Syntax

If present, this element shall have the contents consisting of the following (in order):

- a) a required <Organization> element – the content of this element shall be a string of ISO/IEC 10646 characters;
- b) a required <Type> element – the content of this element shall be a string of ISO/IEC 10646 characters.

13.23.2 Semantics

13.23.2.1 This element represents the CBEFF_BDB_quality_algorithm_owner and CBEFF_BDB_quality_algorithm data elements, and carries the organization code and type code, respectively, as registered with the Biometric Registry Authority.

13.23.2.2 The <Organization> element represents the organization/owner/vendor code as specified in the registry.

13.23.2.3 The <Type> element represents the type code as specified in the registry.

13.24 Element <SBInfo>

13.24.1 Syntax

13.24.1.1 This element shall have content consisting of the following (in order):

- a) an optional <Format> element (see [13.25](#)).

13.24.1.2 If the parent <BIR> element has a child <SB> element, then the <Format> element shall be present in this <SBInfo> element unless it is present in the child <SBInfo> element of an ancestor <BIR> element (see also [13.11.1.5](#)).

NOTE 1 The ancestor <BIR> elements mentioned in the last two subclauses above need not be the same.

NOTE 2 When the parent <BIR> element has a child <SB> element and one omits both children of the <SBInfo> element, the <SBInfo> element will have no attributes and an empty content. Omission of the <SBInfo> element is not allowed in this case (see [13.11.1.5](#)).

13.24.2 Semantics

13.24.2.1 If the BIR has an SB (the <BIR> element has a child <SB> element), then the <SBInfo> element carries information about that SB. In addition, if the BIR has one or more child BIRs (the <BIR> element has one or more child <BIR> elements), the information carried by the child element of the <SBInfo> element is inherited by those child BIRs except where overridden by a corresponding child element of the <SBInfo> element of a child BIR. The information inherited by a BIR with an SB applies to that SB, and (if the BIR has itself child BIRs) is further inherited by its child BIRs in the same way (and so on recursively).

13.25 Element <Format> of SBInfoType

13.25.1 Syntax

If present, this element shall have the contents consisting of the following (in order):

- a) a required <Organization> element – the content of this element shall be a string of ISO/IEC 10646 characters;
- b) a required <Type> element – the content of this element shall be a string of ISO/IEC 10646 characters.

13.25.2 Semantics

13.25.2.1 This element represents the CBEFF_SB_format_owner and CBEFF_SB_format_type data elements, and carries the organization code and type code, respectively, as registered with the Biometric Registry Authority.

13.25.2.2 The <Organization> element represents the organization/owner/vendor code as specified in the registry.

13.25.2.3 The <Type> element represents the type code as specified in the registry.

13.26 Representation of Integers

13.26.1 A non-negative integer shall be represented as a string of one or more ISO/IEC 10646 characters in the range DIGIT ZERO to DIGIT NINE (“0” to “9”) in decimal notation.

13.26.2 A negative integer shall be represented as the corresponding positive integer, preceded by a HYPHEN-MINUS character (“-”).

13.26.3 Arbitrary whitespace is allowed before and after the encoding, but is forbidden inside the encoding.

13.27 Representation of Octet Strings

13.27.1 An octet string shall be represented as a string of the following ISO/IEC 10646 characters:

- a) LATIN CAPITAL LETTER A to LATIN CAPITAL LETTER Z;
- b) LATIN SMALL LETTER A to LATIN SMALL LETTER Z;
- c) DIGIT ZERO to DIGIT NINE;
- d) PLUS SIGN;

- e) SOLIDUS;
- f) EQUALS SIGN;

forming the Base64 encoding of the octet string (see IETF RFC 2045), with all whitespace removed.

13.27.2 Arbitrary whitespace is allowed before and after the encoding, but is forbidden inside the encoding.

13.28 Representation of Date and Time of the Day

13.28.1 A date and time of the day shall be represented as a string of ISO/IEC 10646 characters in the following format, which conforms to ISO 8601.

13.28.2 The encoding shall be the concatenation of all the following components (in order):

- a) the “year” component, consisting of the year encoded in four digits (“2000” to “2999”);
- b) the hyphen character “-”;
- c) the “month” component, consisting of the month encoded in two digits (“01” to “12”);
- d) the hyphen character “-”;
- e) the “day” component, consisting of the day encoded in two digits (“01” to “31”);
- f) the letter “T”;
- g) the “hour” component, consisting of the hour encoded in two digits (“00” to “23”);
- h) the colon character “:”;
- i) the “minute” component, consisting of the minute encoded in two digits (“00” to “59”);
- j) the colon character “:”;
- k) the “second” component, consisting of the second encoded in two digits (“00” to “59”);
- l) the letter “Z”.

13.28.3 The “year”, “month”, “day”, “hour”, “minute”, and “second” components shall be present.

13.28.4 The letter “T” shall be present.

13.28.5 The letter “Z” shall be present whether or not the “hour” component is present.

NOTE This letter indicates that the date and time of the day are UTC.

13.28.6 Arbitrary whitespace is allowed before and after the encoding, but is forbidden inside the encoding.

13.29 Representation of Universally Unique Identifiers

NOTE The following subclauses describe the same representation of a UUID as is specified in ISO/IEC 9834-8, clause 8. An example of such a representation is: f81d4fae-7dec-11d0-a765-00a0c91e6bf6

13.29.1 A universally unique identifier (UUID) shall be represented as a string of ISO/IEC 10646 characters. Each string shall contain exactly 36 characters from the union of the following sets:

- a) DIGIT ZERO to DIGIT NINE ("0" to "9"), each representing a hexadecimal digit 0 through 9;
- b) LATIN CAPITAL LETTER A to LATIN CAPITAL LETTER F ("A" to "F"), each representing a hexadecimal digit A through F;
- c) LATIN SMALL LETTER A to LATIN SMALL LETTER F ("a" to "f"), each representing a hexadecimal digit A through F;
- d) HYPHEN-MINUS ("-").

13.29.2 Each of the positions 9, 14, 19, and 24 of an encoding shall contain a character from set (d).

The other 32 positions shall contain characters from sets (a) through (c).

13.29.3 Arbitrary whitespace is allowed before and after the encoding, but is forbidden inside the encoding.

13.30 XML schema of the patron format

```
<?xml version="1.0" encoding="utf-8"?>

<!--
Permission is hereby granted, free of charge in perpetuity, to any
person obtaining a copy of the Schema, to use, copy, modify, merge and
distribute free of charge, copies of the Schema for the purposes of
developing, implementing, installing and using software based on the
Schema, and to permit persons to whom the Schema is furnished to do
so, subject to the following conditions:

THE SCHEMA IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS
OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF
MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT.
IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY
CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT,
TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE
SCHEMA OR THE USE OR OTHER DEALINGS IN THE SCHEMA.
-->

<xs:schema
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns="http://standards.iso.org/iso-iec/19785/-3/ed-2/"
  targetNamespace="http://standards.iso.org/iso-iec/19785/-3/ed-2/"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified">

  <xs:element name="BIR" type="BIRType"/>

  <xs:complexType name="BIRType">
    <xs:sequence>
      <xs:element name="Version" type="VersionType"
        minOccurs="0"/>
      <xs:element name="CBEFFVersion" type="VersionType"
        minOccurs="0"/>
      <xs:any namespace="##other" processContents="skip"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="BIRInfo" type="BIRInfoType"/>
      <xs:element name="BDBInfo" type="BDBInfoType"
        minOccurs="0"/>
      <xs:element name="SBInfo" type="SBInfoType" minOccurs="0"/>
      <xs:element name="BIR" type="BIRType" minOccurs="0"
        maxOccurs="unbounded"/>
      <xs:element name="BDB" type="xs:base64Binary"
        minOccurs="0"/>
      <xs:element name="SB" type="xs:base64Binary" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
```

```

<xs:complexType name="VersionType">
  <xs:sequence>
    <xs:element name="Major" type="xs:unsignedInt"/>
    <xs:element name="Minor" type="xs:unsignedInt"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="BIRInfoType">
  <xs:sequence>
    <xs:element name="Creator" type="xs:string" minOccurs="0"/>
    <xs:element name="Index" type="UUIDType" minOccurs="0"/>
    <xs:element name="Payload" type="xs:base64Binary"
minOccurs="0"/>
    <xs:element name="Integrity" type="xs:boolean"/>
    <xs:element name="CreationDate" type="xs:dateTime"
minOccurs="0"/>
    <xs:element name="NotValidBefore" type="xs:dateTime"
minOccurs="0"/>
    <xs:element name="NotValidAfter" type="xs:dateTime"
minOccurs="0"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="BDBInfoType">
  <xs:sequence>
    <xs:element name="ChallengeResponse" type="xs:base64Binary"
minOccurs="0"/>
    <xs:element name="Index" type="UUIDType" minOccurs="0"/>
    <xs:element name="Format" type="RegistryIDType"
minOccurs="0"/>
    <xs:element name="Encryption" type="xs:boolean"
minOccurs="0"/>
    <xs:element name="CreationDate" type="xs:dateTime"
minOccurs="0"/>
    <xs:element name="NotValidBefore" type="xs:dateTime"
minOccurs="0"/>
    <xs:element name="NotValidAfter" type="xs:dateTime"
minOccurs="0"/>
    <xs:element name="Type" type="MultipleTypesType"
minOccurs="0"/>
    <xs:element name="Subtype" type="SubtypeType"
minOccurs="0"/>
    <xs:element name="Level" type="ProcessedLevelType"
minOccurs="0"/>
    <xs:element name="Product" type="RegistryIDType"
minOccurs="0"/>
    <xs:element name="CaptureDevice" type="RegistryIDType"
minOccurs="0"/>
    <xs:element name="FeatureExtractionAlgorithm"
type="RegistryIDType" minOccurs="0"/>
    <xs:element name="ComparisonAlgorithm" type="RegistryIDType"
minOccurs="0"/>
    <xs:element name="CompressionAlgorithm"
type="RegistryIDType" minOccurs="0"/>
    <xs:element name="Purpose" type="PurposeType"
minOccurs="0"/>
    <xs:element name="Quality" type="QualityType"
minOccurs="0"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="RegistryIDType">
  <xs:sequence>
    <xs:element name="Organization" type="xs:string"/>
    <xs:element name="Type" type="xs:string"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="SBInfoType">
  <xs:sequence>

```

```

        <xs:element name="Format" type="RegistryIDType"
            minOccurs="0"/>
    </xs:sequence>
</xs:complexType>

<xs:simpleType name="QualityScoreType">
    <xs:restriction base="xs:unsignedInt">
        <xs:maxInclusive value="100"/>
    </xs:restriction>
</xs:simpleType>

<xs:complexType name="QualityType">
    <xs:sequence>
        <xs:element name="Algorithm" type="RegistryIDType"/>
        <xs:choice>
            <xs:element name="Score" type="QualityScoreType"/>
            <xs:element name="QualityCalculationFailed"
type="xs:string"/>
        </xs:choice>
    </xs:sequence>
</xs:complexType>

<xs:simpleType name="SingleTypeType">
<xs:restriction base="xs:string">
    <xs:enumeration value="Scent"/>
    <xs:enumeration value="DNA"/>
    <xs:enumeration value="Ear"/>
    <xs:enumeration value="Face"/>
    <xs:enumeration value="Finger"/>
    <xs:enumeration value="Foot"/>
    <xs:enumeration value="HandGeometry"/>
    <xs:enumeration value="Vein"/>
    <xs:enumeration value="Iris"/>
    <xs:enumeration value="Retina"/>
    <xs:enumeration value="Voice"/>
    <xs:enumeration value="Gait"/>
    <xs:enumeration value="Keystroke"/>
    <xs:enumeration value="LipMovement"/>
    <xs:enumeration value="SignatureSign"/>
    <xs:enumeration value="Palm"/>
    <xs:enumeration value="BackOfHand"/>
    <xs:enumeration value="Wrist"/>
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="MultipleTypesType">
    <xs:list itemType="SingleTypeType"/>
</xs:simpleType>

<xs:simpleType name="SingleAnySubtypeType">
    <xs:restriction base="xs:string">
        <xs:enumeration value="Left"/>
        <xs:enumeration value="Right"/>
        <xs:enumeration value="Thumb"/>
        <xs:enumeration value="IndexFinger"/>
        <xs:enumeration value="MiddleFinger"/>
        <xs:enumeration value="RingFinger"/>
        <xs:enumeration value="LittleFinger"/>
    </xs:restriction>
</xs:simpleType>

<xs:simpleType name="SingleVeinOnlySubtypeType">
    <xs:restriction base="xs:string">
        <xs:enumeration value="LeftVein"/>
        <xs:enumeration value="RightVein"/>
        <xs:enumeration value="Palm"/>
        <xs:enumeration value="BackOfHand"/>
        <xs:enumeration value="Wrist"/>
        <xs:enumeration value="Reserved1"/>
        <xs:enumeration value="Reserved2"/>
    </xs:restriction>
</xs:simpleType>

```

```

</xs:simpleType>

<xs:simpleType name="MultipleAnySubtypesType">
  <xs:list itemType="SingleAnySubtypeType"/>
</xs:simpleType>

<xs:simpleType name="MultipleVeinOnlySubtypesType">
  <xs:list itemType="SingleVeinOnlySubtypeType"/>
</xs:simpleType>

<xs:simpleType name="SubtypeType">
  <xs:union memberTypes="MultipleAnySubtypesType
MultipleVeinOnlySubtypesType"/>
</xs:simpleType>

<xs:simpleType name="ProcessedLevelType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Raw"/>
    <xs:enumeration value="Intermediate"/>
    <xs:enumeration value="Processed"/>
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="PurposeType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Verify"/>
    <xs:enumeration value="Identify"/>
    <xs:enumeration value="Enroll"/>
    <xs:enumeration value="EnrollVerify"/>
    <xs:enumeration value="EnrollIdentify"/>
    <xs:enumeration value="Audit"/>
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="UUIDType">
  <xs:restriction base="xs:string">
    <xs:pattern value="[a-fA-F0-9]{8}\-([a-fA-F0-9]{4}\-){3}[a-
fA-F0-9]{12}"/>
  </xs:restriction>
</xs:simpleType>
</xs:schema>

```

NOTE NO VALUE AVAILABLE is encoded by the absence of optional fields in the XML encoding. There is little value in, for example, having the following string appear in a record: <level> no value available <level>.

13.31 ASN.1 schema of the patron format

```

XML-PATRON-FORMAT DEFINITIONS
XER INSTRUCTIONS
AUTOMATIC TAGS ::=
BEGIN
IMPORTS BiometricDataBlock, Version, RegistryID, ProcessedLevel, Purpose,
SecurityBlock
FROM CBEFF-DATA-ELEMENTS
{iso standard 19785 modules(0) types-for-cbeff-data-elements(1)};
BIR ::= SEQUENCE {

    version Version OPTIONAL,
    cBEFFVersion Version OPTIONAL,
    elemlist [UNTAGGED] SEQUENCE OF elem UTF8String (CONSTRAINED BY
        /* Shall conform to the "AnyElementFormat" specified
        in ITU-T Rec. X.693 | ISO/IEC 8825-4, clause 19
        */),
    bIRInfo BIRInfoType,
    bDBInfo BDBInfoType OPTIONAL,
    sBInfo SBInfoType OPTIONAL,
    birlist [UNTAGGED] SEQUENCE OF bIR BIR,
    bDB [BASE64] BiometricDataBlock OPTIONAL,
    sB [BASE64] SecurityBlock OPTIONAL
}
BIRInfoType ::= SEQUENCE {

```

```

        creator UTF8String OPTIONAL,
        index UUID OPTIONAL,
        payload [BASE64] OCTET STRING OPTIONAL,
        integrity BOOLEAN,
        creationDate DATE-TIME OPTIONAL,
        notValidBefore DATE-TIME OPTIONAL,
        notValidAfter DATE-TIME OPTIONAL
    }
    BDBInfoType ::= SEQUENCE {
        challengeResponse [BASE64] OCTET STRING OPTIONAL,
        index UUID OPTIONAL,
        format RegistryID OPTIONAL,
        encryption BOOLEAN OPTIONAL,
        creationDate DATE-TIME OPTIONAL,
        notValidBefore DATE-TIME OPTIONAL,
        notValidAfter DATE-TIME OPTIONAL,
        type [LIST] SEQUENCE OF SingleTypeType OPTIONAL,
        subtype Subtype OPTIONAL,
        level ProcessedLevel OPTIONAL,
        product RegistryID OPTIONAL,
        captureDevice RegistryID OPTIONAL,
        featureExtractionAlgorithm RegistryID OPTIONAL,
        comparisonAlgorithm RegistryID OPTIONAL,
        compressionAlgorithm RegistryID OPTIONAL,
        purpose Purpose OPTIONAL,
        quality Quality OPTIONAL
    }
    SBInfoType ::= SEQUENCE {
        format RegistryID OPTIONAL
    }
    Quality ::= SEQUENCE {
        algorithm RegistryID,
        qualityScoreType QualityScoreType
    }
    QualityScoreType ::= CHOICE {
        score INTEGER (0..MAX),
        qualityCalculationFailed UTF8String
    }
    SingleTypeType ::= ENUMERATED {
        scent,
        dNA,
        ear,
        face,
        finger,
        foot,
        handGeometry,
        vein,
        iris,
        retina,
        voice,
        gait,
        keystroke,
        lipMovement,
        signatureSign
    }
    SingleAnySubtypeType ::= ENUMERATED {
        left,
        right,
        thumb,
        pointerFinger,
        middleFinger,
        ringFinger,
        littleFinger
    }
    SingleVeinOnlySubtypeType ::= ENUMERATED {
        leftVein,
        rightVein,
        palm,
        backOfHand,
        wrist,
        reserved1,

```

```

        reserved2
    }
    MultipleAnySubtypesType ::= [LIST] SEQUENCE OF SingleAnySubtypeType
    MultipleVeinOnlySubtypesType ::= [LIST] SEQUENCE OF SingleVeinOnlySubtypeType
    Subtype ::= [USE-UNION] CHOICE {
        multipleAnySubtypes [NAME AS CAPITALIZED] MultipleAnySubtypesType,
        multipleVeinOnlySubtypes [NAME AS CAPITALIZED]
    }
MultipleVeinOnlySubtypesType
    }
    UUID ::= IA5String (SIZE(36)) (PATTERN "[a-fA-F0-9]#(8)\-([a-fA-F0-9]#(4)\-
)#(3)[a-fA-F0-9]{12}")
    ENCODING-CONTROL XER
    GLOBAL-DEFAULTS MODIFIED-ENCODINGS
    GLOBAL-DEFAULTS CONTROL-NAMESPACE
    "http://www.w3.org/2001/XMLSchema-instance" PREFIX "xsi"
    NAMESPACE ALL, ALL IN ALL AS "iso-iec.jtc1.sc37.common" PREFIX "ns"
    NOT NAMESPACE ALL IN BIRInfoType, ALL IN BDBInfoType, ALL IN
    SBInfoType
    NAMESPACE index, payload IN BIRInfoType, index, challengeResponse IN
BDBInfoType
    AS "iso-iec.jtc1.sc37.common" PREFIX "ns"
    TEXT BDBInfoType.type.*:ALL, SingleAnySubtypeType:ALL,
    SingleVeinOnlySubtypeType:ALL, BDBInfoType.level:ALL, BDBInfoType.purpose:ALL
    ANY-ELEMENT BIR.elemlist.elem EXCEPT ABSENT
    "iso-iec.jtc1.sc37.common"
    TEXT SingleTypeType:ALL AS CAPITALIZED
    TEXT SingleAnySubtypeType:ALL AS CAPITALIZED
    TEXT SingleVeinOnlySubtypeType:ALL AS CAPITALIZED
    TEXT Processed:ALL AS CAPITALIZED
    TEXT PURPOSE:ALL AS CAPITALIZED
    NAME AS CAPITALIZED
    NAME BIR AS UPPERCASED
    END

```

13.32 An example of a simple BIR in XML encoding (complying with the ASN.1 schema, the XSD schema, and the normative textual description)

```

<?xml version="1.0" encoding="utf-8"?>
<BIR xmlns="http://standards.iso.org/iso-iec/19785/-3/ed-2/">
  <Version>
    <Major>2</Major>
    <Minor>0</Minor>
  </Version>
  <CBEFFVersion>
    <Major>2</Major>
    <Minor>0</Minor>
  </CBEFFVersion>
  <BIRInfo>
    <Creator>ABCDE</Creator>
    <Index>86CA3100-43F3-0D23-A941-7871E519A00E</Index>
    <Payload>UjBsR09EbGhjZ0dTQUxNQUBUUNBRU1tQ1p0dU1GUXhEUzhi</Payload>
    <Integrity>true</Integrity>
    <CreationDate>2004-03-02T15:03:15Z</CreationDate>
    <NotValidBefore>2004-03-02T15:00:00Z</NotValidBefore>
    <NotValidAfter>2004-03-03T15:00:00Z</NotValidAfter>
  </BIRInfo>
  <BDBInfo>
    <ChallengeResponse>dTQUxNQUBUUNBRU1tQ1p0dU1GUXhEUzhi</
ChallengeResponse>
    <Index>86CA3100-43F3-0D23-A941-7871E519A00E</Index>
    <Format>
      <Organization>51</Organization>
      <Type>99</Type>
    </Format>
    <Encryption>true</Encryption>
    <CreationDate>2004-03-02T15:00:00Z</CreationDate>
    <NotValidBefore>2004-03-02T15:00:00Z</NotValidBefore>
    <NotValidAfter>2004-03-02T15:00:00Z</NotValidAfter>
    <Type>Iris</Type>
    <Subtype>Left</Subtype>
    <Level>Processed</Level>

```

```

    <Product>
      <Organization>16</Organization>
      <Type>2</Type>
    </Product>
    <Purpose>Verify</Purpose>
    <Quality>
      <Algorithm>
        <Organization>4</Organization>
        <Type>9</Type>
      </Algorithm>
      <Score>100</Score>
    </Quality>
  </BDBInfo>
  <SBInfo>
    <Format>
      <Organization>51</Organization>
      <Type>99</Type>
    </Format>
  </SBInfo>
  <BDB>Q1UjBsR09EbGhjZ0p0dU1GUXhEUzhidTQUxNQUBUUNBRU1t</BDB>
  <SB>1tQ1UjBsR09EbGhjZ0p0dU1GUXhEUzhidTQUxNQUBUUNBRU1t</SB>
</BIR>

```

13.33 An example of a complex BIR in XML encoding (complying with the ASN.1 schema, the XSD schema, and the normative textual description)

```

<?xml version="1.0" encoding="utf-8"?>
<BIR xmlns="http://standards.iso.org/iso-iec/19785/-3/ed-2/">
  <Version>
    <Major>2</Major>
    <Minor>0</Minor>
  </Version>
  <CBEFFVersion>
    <Major>2</Major>
    <Minor>0</Minor>
  </CBEFFVersion>
  <BIRInfo>
    <Creator>ABCDE</Creator>
    <Index>86CA3100-43F3-0D23-A941-7871E519A00E</Index>
    <Payload>UjBsR09EbGhjZ0dUxNQUBUUNBRU1tQ1p0dU1GUXhEUzhi</Payload>
    <Integrity>true</Integrity>
    <CreationDate>2004-03-02T15:03:15Z</CreationDate>
    <NotValidBefore>2004-03-02T15:00:00Z</NotValidBefore>
    <NotValidAfter>2004-03-02T15:00:00Z</NotValidAfter>
  </BIRInfo>
  <SBInfo>
    <Format>
      <Organization>51</Organization>
      <Type>99</Type>
    </Format>
  </SBInfo>
  <BIR>
    <BIRInfo>
      <Creator>ABCDE</Creator>
      <Index>310086CA-43F3-0D23-A941-7871E519A00E</Index>
      <Payload>09EbUjBsRGhjZ0dUxNQUBUUNBRU1tQ1p0dU1GUXhEUzhi</Payload>
      <Integrity>false</Integrity>
      <CreationDate>2004-03-02T00:00:00Z</CreationDate>
      <NotValidBefore>2004-03-02T15:00:00Z</NotValidBefore>
      <NotValidAfter>2004-03-02T15:33:00Z</NotValidAfter>
    </BIRInfo>
    <BDBInfo>
      <ChallengeResponse>c2Rmc2RmZHNmZzM0NmVydGZnZmQ=</ChallengeResponse>
      <Index>310086CA-43F3-0D23-A941-7871E519A00E</Index>
      <Format>
        <Organization>51</Organization>
        <Type>99</Type>
      </Format>
      <Encryption>true</Encryption>
      <CreationDate>2004-03-02T15:00:00Z</CreationDate>
      <NotValidBefore>2004-03-02T15:00:00Z</NotValidBefore>
    </BDBInfo>
  </BIR>
</BIR>

```

```

<NotValidAfter>2004-03-02T15:00:00Z</NotValidAfter>
<Type>Iris</Type>
<Subtype>Left</Subtype>
<Level>Processed</Level>
<Product>
  <Organization>16</Organization>
  <Type>2</Type>
</Product>
<Purpose>Verify</Purpose>
<Quality>
  <Algorithm>
    <Organization>4</Organization>
    <Type>9</Type>
  </Algorithm>
  <Score>100</Score>
</Quality>
</BDBInfo>
<SBInfo>
  <Format>
    <Organization>51</Organization>
    <Type>99</Type>
  </Format>
</SBInfo>
<BDB>VGhpcyBpcyBhbiBJU08gc3RhbmRhcmQ= </BDB>
<SB>U2VjdXJpdHkgQmxvY2s= </SB>
</BIR>
<BIR>
  <BIRInfo>
    <Creator>ABCDE</Creator>
    <Index>00130224-0D23-1193-BEAD-7871E519A00E</Index>
    <Payload>UGF5bG9hZCBnb2VzIGhlcmU= </Payload>
    <Integrity>true</Integrity>
    <CreationDate>2004-03-02T15:00:00Z</CreationDate>
    <NotValidBefore>2004-03-02T15:00:00Z</NotValidBefore>
    <NotValidAfter>2004-03-02T15:00:00Z</NotValidAfter>
  </BIRInfo>
  <BDBInfo>
    <ChallengeResponse>Q2hhbGxlbmd1UmVzcG9uc2UgZ291cyBoZXJl</ChallengeResponse>
    <Index>00130224-0D23-1193-BEAD-7871E519A00E</Index>
    <Format>
      <Organization>51</Organization>
      <Type>88</Type>
    </Format>
    <Type>Iris</Type>
    <Level>Processed</Level>
    <Product>
      <Organization>51</Organization>
      <Type>88</Type>
    </Product>
    <Purpose>Enroll</Purpose>
  </BDBInfo>
  <SBInfo>
    <Format>
      <Organization>51</Organization>
      <Type>99</Type>
    </Format>
  </SBInfo>
</BIR>
  <BIRInfo>
    <Integrity>false</Integrity>
  </BIRInfo>
  <BDBInfo>
    <Encryption>true</Encryption>
    <CreationDate>2004-03-02T15:00:00Z</CreationDate>
    <NotValidBefore>2004-03-02T15:00:00Z</NotValidBefore>
    <NotValidAfter>2004-03-02T15:00:00Z</NotValidAfter>
    <Subtype>Left</Subtype>
    <Quality>
      <Algorithm>
        <Organization>4</Organization>
        <Type>9</Type>

```

```

        </Algorithm>
        <Score>90</Score>
    </Quality>
</BDBInfo>
<SBInfo>
    <Format>
        <Organization>51</Organization>
        <Type>99</Type>
    </Format>
</SBInfo>
<BDB>QmlvbWV0cm1jRGF0YUJsb2NrIGdvZXMGaGVyZQ==</BDB>
<SB>U2VjdXJpdHkgQmxvY2s=</SB>
</BIR>
<BIR>
    <BIRInfo>
        <Integrity>>false</Integrity>
    </BIRInfo>
    <BDBInfo>
        <Encryption>>true</Encryption>
        <CreationDate>2004-03-02T15:00:00Z</CreationDate>
        <NotValidBefore>2004-03-02T15:00:00Z</NotValidBefore>
        <NotValidAfter>2004-03-02T15:00:00Z</NotValidAfter>
        <Subtype>Right</Subtype>
        <Quality>
            <Algorithm>
                <Organization>4</Organization>
                <Type>9</Type>
            </Algorithm>
            <QualityCalculationFailed />
        </Quality>
    </BDBInfo>
    <SBInfo>
        <Format>
            <Organization>51</Organization>
            <Type>99</Type>
        </Format>
    </SBInfo>
    <BDB>QmlvbWV0cm1jRGF0YUJsb2NrIGdvZXMGaGVyZQ==</BDB>
    <SB>QSBTQiBzaG91bGQgZ291cyBoZXJl</SB>
</BIR>
<SB>QW5vdGhlciBTQiBzaG91bGQgZ291cyBoZXJl</SB>
</BIR>
<SB>QSBmaW5hbCBTQiBzaG91bGQgZ291cyBoZXJl</SB>
</BIR>

```

14 Patron format specification: complex patron format (with additional data elements)

14.1 Patron

ISO/IEC JTC 1/SC 37

14.2 Patron format owner

257 (0101_{Hex}). The Biometric Registration Authority has allocated this identifier for ISO/IEC JTC 1/SC 37.

14.3 Patron format name

ISO/IEC JTC 1/SC 37 complex patron format (with additional data elements).

14.4 Patron format type

10 (000A_{Hex}). This has been registered in accordance with ISO/IEC 19785-2.

14.5 ASN.1 object identifier for this patron format

```
{iso registration-authority cbeff(19785) biometric-organization(0) jtc1-sc37(257) patron-format(1) full-complex(10)}
```

or, in XML value notation,

```
<OBJECT_IDENTIFIER>1.1.19785.0.257.1.10</OBJECT_IDENTIFIER>
```

14.6 Domain of use

This clause provides a definition of a patron format that may be of general utility to applications that need to carry one or more BIRs (of either the same or different patron formats) in a single complex BIR structure, with explicit identification of the patron format(s) being used.

This patron format is identical to that specified in [Clause 12](#) except for the addition of ten new data elements (capture device owner and identifier, feature extraction algorithm owner and identifier, comparison algorithm owner and identifier, quality algorithm owner and identifier, and compression algorithm owner and identifier) and a “fieldPresence” field that is one byte longer.

14.7 Version identifier

This patron format specification has a version identifier of 1.

14.8 CBEFF version

This specification conforms to CBEFF version (major 2, minor 0).

14.9 General

14.9.1 This patron format supports all the mandatory and optional data elements specified in ISO/IEC 19785-1. It can support either a simple BIR or a complex BIR structure where each intermediate node or leaf of the structure is itself a BIR (called a “child BIR”) and can be represented in any patron format.

14.9.2 The patron format of each child BIR is explicitly identified in its parent by a pair: patron format owner / patron format type, and can be either this patron format (in which case the child BIR may itself have children), or a different patron format (in which case the child BIR is considered a leaf of this patron format although it may be a complex BIR in its own regard).

14.9.3 Most fields in this patron format are optional. The presence of each optional field is encoded as a single bit of a 32-bit field (“fieldPresence”) at the beginning of the format, which has one bit for each optional field defined in the patron format. The bit value ‘1’ in a given position of that field means that the corresponding field is present in the BIR instance.

14.9.4 All character strings and octet strings are preceded by a length prefix, which can be one, two, or four octets long, as specified for each field.

14.9.5 All integer values, including lengths, are encoded in big-endian order.

14.9.6 Dates and date intervals are encoded as character strings in a way conforming to ISO 8601.

14.9.7 An instance of a BIR or child BIR contains either a BDB or one or more BIR children, but never contains both.

14.10 Specification

An instance of a BIR shall contain the fields specified below, in exactly the same order and with no gaps between the fields.

CBEFF data element name	Field name	Length and optionality ^a	Abstract values and Encodings ^b
<i>The following fields shall occur at most once</i>			
CBEFF_patron_header_version	patronHeaderVersion	1, mandatory	1
CBEFF_version	cbeffVersion	1, mandatory	Major '2' and Minor '0': 20 _{Hex} (32)
<i>not a standard CBEFF data element</i>	fieldPresence	4, mandatory	A 32-bit field containing one bit for each optional field in the patron format. The bit value '1' means that the corresponding field is present in the BIR instance.
			Bit position (1=most significant, 32=least significant) and corresponding optional field: 1 bdbFormat Owner & Type 2 bdbEncryption 3 bdbBiometricType 4 bdbBiometricSubtype 5 bdbChallengeResponse 6 bdbCreationDate 7 bdbIndex 8 bdbProcessedLevel 9 bdbProduct Owner & Type 10 bdbCaptureDevice Owner & Type 11 bdbFeatureExtAlg Owner & Type 12 bdbComparisonAlg Owner & Type 13 bdbQualityAlg Owner & Type 14 bdbCompressionAlg Owner & Type 15 bdbPurpose 16 bdbQuality 17 bdbValidityPeriod 18 birCreationDate 19 birCreator 20 birIndex 21 birPayload 22 birValidityPeriod 23 sbFormat Owner & Type 24 bdb 25 sb 26..32 not used (shall be '0')

CBEFF data element name	Field name	Length and optionality ^a	Abstract values and Encodings ^b
CBEFF_BDB_format_owner	bdbFormatOwner	2, mandatory if a BDB is present, optional if a BDB is not present.	0..65535
CBEFF_BDB_format_type	bdbFormatType	2, mandatory if a BDB is present, optional if a BDB is not present.	0..65535
CBEFF_BDB_encryption_options	bdbEncryption	1, mandatory if a BDB is present, other-wise required to be absent.	NO ENCRYPTION: 0 ENCRYPTION: 1
CBEFF_BIR_integrity_options	birIntegrity	1, mandatory	NO INTEGRITY: 0 INTEGRITY: 1
CBEFF_BDB_biometric_type	bdbBiometricType	3	<i>This encoding is a 3 octet bitmap. NO VALUE AVAILABLE is encoded as all 0 bits. If MULTIPLE BIOMETRIC TYPES is set, other bits may also be set to enumerate the types contained in the BDB.</i> NO VALUE AVAILABLE: 000000_{Hex} MULTIPLE BIOMETRIC TYPES: 000001_{Hex} FACE: 000002_{Hex} VOICE: 000004_{Hex} FINGER: 000008_{Hex} IRIS: 000010_{Hex} RETINA: 000020_{Hex} HAND GEOMETRY: 000040_{Hex} SIGNATURE OR SIGN: 000080_{Hex} KEYSTROKE: 000100_{Hex} LIP MOVEMENT: 000200_{Hex} GAIT: 001000_{Hex} VEIN: 002000_{Hex} DNA: 004000_{Hex} EAR: 008000_{Hex} FOOT: 010000_{Hex} SCENT: 020000_{Hex}

CBEFF data element name	Field name	Length and optionality ^a	Abstract values and Encodings ^b
CBEFF_BDB_biometric_subtype	bdbBiometricSubtype	1	<i>This encoding is a 1 octet bitmap.</i> <i>Combinations of abstract values are permitted (by ORing the encodings for those values) when the abstract value encoded in CBEFF_BDB_biometric_type represents a biometric technology that can create a BDB where multiple subtypes are supported.</i> NO VALUE AVAILABLE: b'0000 0000' LEFT: 0001' b'0000 RIGHT: 0010' b'0000 LEFT THUMB: b'0000 0101' LEFT INDEX FINGER: b'0000 1001' LEFT MIDDLE FINGER: b'0001 0001' LEFT RING FINGER: b'0010 0001' LEFT LITTLE FINGER: b'0100 0001' RIGHT THUMB: b'0000 0110' RIGHT INDEX FINGER: b'0000 1010' RIGHT MIDDLE FINGER: b'0001 0010'
			RIGHT RING FINGER: b'0010 0010' RIGHT LITTLE FINGER: b'0100 0010' LEFT PALM: b'1000 0101' LEFT BACK OF HAND: b'1000 1001' LEFT WRIST: b'1001 0001' RIGHT PALM: b'1000 0110' RIGHT BACK OF HAND: b'1000 1010' RIGHT WRIST: b'1001 0010'
CBEFF_BDB_challenge_response	bdbChallengeResponse	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets).
CBEFF_BDB_creation_date	bdbCreationDate	1 + 8..15	Variable-length ASCII character string, preceded by an 8-bit integer field containing the length (characters). The string shall represent a date (or date and a time of the day) ^c .
CBEFF_BDB_index	bdbIndex	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets). Shall not appear in any BIR in which numChildren is not x'00'.
CBEFF_BDB_processed_level	bdbProcessedLevel	1	RAW: 1 INTERMEDIATE: 2 PROCESSED: 3
CBEFF_BDB_product_owner	bdbProductOwner	2	1..65535
CBEFF_BDB_product_type	bdbProductType	2	1..65535