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AMENDMENT 1
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Information technology — Common Biometric Exchange Formats Framework —

Part 3: Patron format specifications

AMENDMENT 1: Support for Additional Data Elements

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

Partie 3: Spécifications de format d'usager

AMENDEMENT 1: Support pour éléments de données additionnels

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Foreword

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The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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Amendment 1 to ISO/IEC 19785-3:2007 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

Information technology — Common Biometric Exchange Formats Framework —

Part 3:
Patron format specifications

AMENDMENT 1: Support for Additional Data Elements

Page vii, Introduction, list item g)

Replace the text with the following (where changes to existing text are highlighted with a grey background):

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.

and insert the following new paragraph after the list:

Patron formats can be specified in other standards documents and registered in the CBEFF Registration Authority (see ISO/IEC 19785-2), for example there is a registered patron format specified in ISO/IEC 19784-1. For a complete list of registered patron formats consult the CBEFF Registration Authority web site.

Page 2, immediately after 4.1 i) (biometric product owner)

Insert the following new terms, relabelling the existing terms j) to x) as y) to mm) [where z) is followed by aa), bb), etc.]:

j) capture device

k) capture device identifier

l) capture device owner

m) feature extraction algorithm

n) feature extraction algorithm identifier

o) feature extraction algorithm owner

p) comparison algorithm

q) comparison algorithm identifier

r) comparison algorithm owner

s) quality algorithm

t) quality algorithm identifier

u) quality algorithm owner

v) compression algorithm

w) compression algorithm identifier

x) compression algorithm owner

Page 18, 10.4

Change “(0004 Hex)” to “(0005 Hex)”.

Page 32, 12.4

Change “(06 Hex)” to “(0006 Hex)”.

Page 32, 12.9.1

Replace the subclause with the following (where changes to existing text are highlighted with a grey background):

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, 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.

Page 42, 12.13.2

Change the second cell in the table heading from “Mandatory/optional/absent” to “Mandatory/optional”.

Page 44, 13.9.1

Replace the subclause with the following (where changes to existing text are highlighted with a grey background):

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 except the following ones: 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. 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").

Page 58, 13.21.2

Change the second cell in the table heading from “Mandatory/optional/absent” to “Mandatory/optional”.

Page 68, after Clause 13

Insert the following two new clauses.

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

14.1 Patron

ISO/IEC JTC 1/SC 37

14.2 Patron identifier

257 (0101Hex). This has been allocated by the Registration Authority for ISO/IEC 19785-2.

14.3 Patron format name

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

14.4 Patron format identifier

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,

```
1.1.19785.0.257.1.10
```

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]
The following fields shall occur at most once			
CBEFF_patron_header_version	patronHeaderVersion	1, mandatory	1
CBEFF_version	cbeffVersion	1, mandatory	Major '2' and Minor '0': X'20' (32)
not a standard CBEFF data element	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

CBEFF data element name	Field name	Length and optionality[a]	Abstract values and Encodings[b]
			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_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	*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.* NO VALUE AVAILABLE: X'00 00 00' MULTIPLE BIOMETRIC TYPES: X'00 00 01' FACE: X'00 00 02' VOICE: X'00 00 04' FINGER: X'00 00 08' IRIS: X'00 00 10' RETINA: X'00 00 20' HAND GEOMETRY: X'00 00 40' SIGNATURE OR SIGN: X'00 00 80' KEYSTROKE: X'00 01 00' LIP MOVEMENT: X'00 02 00' GAIT: X'00 10 00' VEIN: X'00 20 00' DNA: X'00 40 00' EAR: X'00 80 00' FOOT: X'01 00 00' SCENT: X'02 00 00'
CBEFF_BDB_biometric_subtype	bdbBiometricSubtype	1	*This encoding is a 1 octet bitmap.* *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*

CBEFF data element name	Field name	Length and optionality[a]	Abstract values and Encodings[b]
			can create a BDB where multiple subtypes are supported. NO VALUE AVAILABLE: b'0000 0000' LEFT: b'0000 0001' RIGHT: b'0000 0010' LEFT THUMB: b'0000 0101' LEFT POINTER 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 POINTER 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_capture_device_owner	bdbCaptureDeviceOwner	2	1..65535
CBEFF_BDB_capture_device_type	bdbCaptureDeviceType	2	1..65535
CBEFF_BDB_feature_extraction_algorithm_owner	bdbFeatureExtAlgOwner	2	1..65535
CBEFF_BDB_feature_extraction_algorithm_type	bdbFeatureExtAlgType	2	1..65535
CBEFF_BDB_comparison_algorithm_owner	bdbComparisonAlgOwner	2	1..65535
CBEFF_BDB_comparison_algorithm_type	bdbComparisonAlgType	2	1..65535
CBEFF_BDB_quality_algorithm_owner	bdbQualityAlgOwner	2	1..65535

CBEFF data element name	Field name	Length and optionality[a]	Abstract values and Encodings[b]
CBEFF_BDB_quality_algorithm_type	bdbQualityAlgType	2	1..65535
CBEFF_BDB_compression_algorithm_owner	bdbCompressionAlgOwner	2	1..65535
CBEFF_BDB_compression_algorithm_type	bdbCompressionAlgType	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_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

CBEFF data element name	Field name	Length and optionality[a]	Abstract values and Encodings[b]
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 24 of the field *fieldPresence*), then no child BIRs shall be included (*numChildren* shall have the value 0). Otherwise, at least one child BIR shall be included (*numChildren* 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
The following 3 fields shall occur as a group as many times as specified in the field numChildren (0..255)			
CBEFF_BIR_patron_format_owner	childBirPatronFormatOwner	2, mandatory if no BDB is present, otherwise required to be absent.	1..65535
CBEFF_BIR_patron_format_type	childBirPatronFormatType	2, mandatory if no BDB is present, otherwise required to be absent.	1..65535
not a standard CBEFF data element	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)[e].
The following field shall occur at most once			
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.

14.11 Illustrative examples

Table 14.1 — "Simple" BIR (one BDB)

Field Name	Length	Abstract Value	Encoding
patronHeaderVersion	1	1	x'01'
cbeffVersion	1	Major 2, Minor 0	x'20'
fieldPresence	3	bdbFormatOwner and Type bdbEncryption bdbBiometricType bdbQuality bdb	x'E0 20 00 20'
bdbFormatOwner	2	ISO/IEC JTC 1/SC 37	257, x'01 01'
bdbFormatType	2	Face image	x'00 08'
bdbEncryption	1	NO ENCRYPTION	x'00'
birIntegrity	1	NO INTEGRITY	x'00'
bdbBiometricType	3	FACE-IMAGE	x'40 00 00'
bdbQuality	1	75/100	x'4B'
Bdb	4 + 4096	octet string	x'00 00 10 00' + 4096 octets
numChildren	1	zero	x'00'

Table 14.2 — 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 POINTER 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 format 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 format B
47.      bdbEncryption = NO ENCRYPTION
48.      birIntegrity = NO INTEGRITY
49.      bdbBiometricSubtype = LEFT RING FINGER
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 14.3 — BIR wrapped in an enveloping BIR

Field Name	Length	Abstract Value	Encoding
patronHeaderVersion	1	1	x'01'
cbeffVersion	1	Major 2, Minor 0	x'20'
fieldPresence	4	all optional fields absent in the enveloping BIR	x'00 00 00 00'
birIntegrity	1	NO INTEGRITY	x'00'
numChildren	1	one child *(the enveloped BIR)*	x'01'
childBirPatronFormatOwner)	2	patron format owner of the enveloped BIR	*variable*
childBirPatronFormatType	2	patron format type of the enveloped BIR	*variable*
childBir (length of the child BIR)	4	length of the enveloped BIR	*variable*
childBir (octets of the child BIR	*variable*	octets of the enveloped BIR	*variable*

Table 14.3 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 16 octets, given by:

a) 8 octets with the fixed values x'01 20 00 00 00 00 00 01'; plus

b) 4 octets containing the patron format owner and type of the enveloped BIR; plus

c) 4 octets containing the length of the enveloped BIR.

14.12 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,
            bdbCaptureDevice            BOOLEAN,
            bdbFeatureExtAlg            BOOLEAN,
            bdbComparisonAlg            BOOLEAN,
            bdbQualityAlg               BOOLEAN,
            bdbCompressionAlg           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,

      bdbCaptureDevice          SEQUENCE {
            bdbCaptureDeviceOwner     INTEGER(0..65535),
            bdbCaptureDeviceType      INTEGER(0..65535)
      } OPTIONAL,

      bdbFeatureExtAlg          SEQUENCE {
            bdbFeatureExtAlgOwner     INTEGER(0..65535),
            bdbFeatureExtAlgType      INTEGER(0..65535)
      } OPTIONAL,

      bdbComparisonAlg          SEQUENCE {
            bdbComparisonAlgOwner     INTEGER(0..65535),
            bdbComparisonAlgType      INTEGER(0..65535)
```

```
        } OPTIONAL,
        bdbQualityAlg               SEQUENCE {
              bdbQualityAlgOwner          INTEGER(0..65535),
              bdbQualityAlgType           INTEGER(0..65535)
        } OPTIONAL,
        bdbCompressionAlg           SEQUENCE {
              bdbCompressionAlgOwner      INTEGER(0..65535),
              bdbCompressionAlgType       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
}
```

14.13 Patron format conformance statement

14.13.1 Identifying information

Required information	Patron format reference
Patron name	See 14.1
Patron identifier	See 14.2
Patron format name	See 14.3
Patron format identifier	See 14.4
Patron format ASN.1 object identifier	See 14.5
Domain of use description	See 14.6
Patron format version	See 14.7
CBEFF version	See 14.8

14.13.2 CBEFF-defined data elements and abstract values

CBEFF data element name	Mandatory/ optional	Patron format field name	Abstract values specified?	Encodings specified?
CBEFF_BDB_format_owner	Mandatory if a BDB is present	bdbFormatOwner	Yes	Yes
CBEFF_BDB_format_type	Mandatory if a BDB is present	bdbFormatType	Yes	Yes
CBEFF_BDB_encryption_options	Mandatory if a BDB is present	bdbEncryption	Yes	Yes
CBEFF_BIR_integrity_options	Mandatory	birIntegrity	Yes	Yes
CBEFF_BDB_subheader_count	Mandatory	numChildren	Yes	Yes
CBEFF_BDB_biometric_type	Optional	bdbBiometricType	Yes	Yes
CBEFF_BDB_biometric_subtype	Optional	bdbBiometricSubtype	Yes	Yes
CBEFF_BDB_challenge_response	Optional	bdbChallengeResponse	Yes	Yes
CBEFF_BDB_creation_date	Optional	bdbCreationDate	Yes	Yes
CBEFF_BDB_index	Optional	bdbIndex	Yes	Yes
CBEFF_BDB_product_owner	Optional	bdbProductOwner	Yes	Yes
CBEFF_BDB_product_type	Optional	bdbProductType	Yes	Yes
CBEFF_BDB_capture_device_owner	Optional	bdbCaptureDeviceOwner	Yes	Yes
CBEFF_BDB_capture_device_type	Optional	bdbCaptureDeviceType	Yes	Yes
CBEFF_BDB_feature_extraction_algorithm_owner	Optional	bdbFeatureExtAlgOwner	Yes	Yes
CBEFF_BDB_feature_extraction_algorithm_type	Optional	bdbFeatureExtAlgType	Yes	Yes
CBEFF_BDB_comparison_algorithm_owner	Optional	bdbComparisonAlgOwner	Yes	Yes
CBEFF_BDB_comparison_algorithm_type	Optional	bdbComparisonAlgType	Yes	Yes
CBEFF_BDB_quality_algorithm_owner	Optional	bdbQualityAlgOwner	Yes	Yes
CBEFF_BDB_quality_algorithm_type	Optional	bdbQualityAlgType	Yes	Yes
CBEFF_BDB_compression_algorithm_owner	Optional	bdbCompressionAlgOwner	Yes	Yes
CBEFF_BDB_compression_algorithm_type	Optional	bdbCompressionAlgType	Yes	Yes
CBEFF_BDB_processed_level	Optional	bdbProcessedLevel	Yes	Yes
CBEFF_BDB_purpose	Optional	bdbPurpose	Yes	Yes
CBEFF_BDB_quality	Optional	bdbQuality	Yes	Yes
CBEFF_BDB_validity_period	Optional	bdbValidityPeriod	Yes	Yes
CBEFF_BIR_creation_date	Optional	birCreationDate	Yes	Yes
CBEFF_BIR_creator	Optional	birCreator	Yes	Yes
CBEFF_BIR_index	Optional	birIndex	Yes	Yes
CBEFF_BIR_patron_format_owner	Mandatory if no BDB is present	childBirPatronFormatOwner	Yes	Yes
CBEFF_BIR_patron_format_type	Mandatory if no BDB is present	childBirPatronFormatType	Yes	Yes

CBEFF data element name	Mandatory/ optional	Patron format field name	Abstract values specified?	Encodings specified?
CBEFF_BIR_payload	Optional	birPayload	Yes	Yes
CBEFF_SB_format_owner	Optional	sbFormatOwner	Yes	Yes
CBEFF_SB_format_type	Optional	sbFormatType	Yes	Yes
CBEFF_BIR_validity_period	Optional	birValidityPeriod	Yes	Yes
patron_header_version	Mandatory	patronHeaderVersion	Yes	Yes
CBEFF_version	Mandatory	cbeffVersion	Yes	Yes
BDB	Optional	bdb	Yes	Yes
SB	Optional	sb	Yes	Yes

14.13.3 Patron-defined data elements and abstract values

Patron format data element name	Mandatory/optional	Patron format field name	Abstract values specified?	Encodings specified?
fieldPresence	Mandatory	fieldPresence	Yes	Yes
childBir	Mandatory if no BDB is present	childBir	Yes	Yes

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

15.1 Patron

ISO/IEC JTC 1/SC 37

15.2 Patron identifier

257 (0101Hex). This has been allocated by the Registration Authority for ISO/IEC 19785-2.

15.3 Patron format name

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

15.4 Patron format identifier

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

15.5 ASN.1 object identifier for this patron format

```
{iso registration-authority cbeff(19785) biometric-organization(0) jtc1-sc37(257) patron-format(1) xml-full(11)}
```

or, in XML value notation,

```
1.1.19785.0.257.1.11
```

15.6 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.

This patron format is identical to that specified in clause 13 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).

15.7 Version identifier

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

15.8 CBEFF version

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

15.9 General

15.9.1 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").

15.9.2 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 signalled by simply including the corresponding element or attribute, and its absence is signalled by simply omitting the corresponding element or attribute.

15.9.3 Special encodings are specified for integers (see 15.17), octet strings (see 15.18), and date and time-of-the-day abstract values (see 15.19).

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

15.9.5 An extension mechanism is specified, which enables the inclusion of application-specific data (not standardized) within a BIR or child BIR (see 15.11.1.6).

15.10 Specification

15.10.1 In the rest of this clause, the terms "element" and "attribute" are used with the meaning of "XML element" and "XML attribute", respectively.

15.10.2 The namespace with the name "**urn:oid:1.1.19785.0.257.1.7.0**" 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)}

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

15.10.4 An instance of a BIR shall be represented as a **<bir>** element (see 15.11).

15.10.5 The **<bir>** element may be the root of an XML document, but this is not required.

15.10.6 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 15.22.

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.

15.10.7 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 15.14.2.1, 15.15.2.1 and 15.16.2.1 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.

15.11 Element <bir>

15.11.1 Syntax

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

a) an optional **<version>** element (see 15.12);

b) an optional **<cbeff-version>** element (see 15.13);

c) zero or more application-specific elements;

d) a mandatory **<bir-info>** element (see 15.14);

e) an optional **<bdb-info>** element (see 15.15);

f) an optional **<sb-info>** element (see 15.16);

g) zero or more **<bir>** elements (see 15.11);

h) an optional **<bdb>** element – the content of this element shall be a valid representation of an octet string (see 15.18);

i) an optional **<sb>** element – the content of this element shall be a valid representation of an octet string.

15.11.1.2 The **<bdb>** 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.

15.11.1.3 The **<sb>** element shall be absent unless its presence is required by 15.14.2.2 or permitted by 15.15.2.3.

15.11.1.4 If the **<bdb>** element is present, then the **<bdb-info>** element shall also be present.

15.11.1.5 If the **<sb>** element is present, then the **<sb-info>** element shall also be present.

15.11.1.6 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 15.10.2).

15.11.2 Semantics

15.11.2.1 This element is either a complex or a simple BIR, depending on which child elements are present. If a child **<bdb>** element is present, this element is a simple BIR. If one or more child **<bir>** elements are present, this element is a complex BIR.

15.11.2.2 The elements **<version>**, **<cbeff-version>**, **<bir-info>**, **<bdb-info>**, and **<sb-info>** and their content form the standard biometric header of the BIR.

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

15.11.2.4 The **<cbeff-version>** element (if present) carries the major and minor version number of the CBEFF standard.

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

15.11.2.6 The **<bdb>** element (if present) carries the biometric data block (BDB) of the BIR.

NOTE – A **<bdb>** element and a **<bir>** element cannot coexist as children of the same **<bir>** element (see 15.11.1.2).

15.11.2.7 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>** element that is a child of the same **<bir>** element.

15.11.2.8 The **<bir-info>** 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 15.14.2.1.

15.11.2.9 The **<bdb-info>** element (if present) carries information about either the BDB of the BIR (if the **<bir>** element has a child **<bdb>** element) or about the BDBs of the descendant BIRs that have a child **<bdb>** element (if the **<bir>** element has one or more child **<bir>** elements), as specified in 15.15.2.1.

15.11.2.10 The **<sb-info>** 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 15.16.2.1.

15.12 Element <version>

15.12.1 Syntax

This element shall have the following attributes:

a) **major** (required) – the value of this attribute shall be a valid representation of an integer in the range 0 to 15 (see 15.17);

b) **minor** (required) – the value of this attribute shall be a valid representation of an integer in the range 0 to 15.

15.12.2 Semantics

15.12.2.1 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.

15.12.2.2 The **major** attribute represents the major version number (0 in this version).

15.12.2.3 The **minor** attribute represents the minor version number (0 in this version).

15.12.2.4 If this element is not present, the attribute values **major="0" minor="0"** are implied.

15.12.2.5 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.

15.13 Element <cbeff-version>

15.13.1 Syntax

This element shall have the following attributes:

a) **major** (required) – the value of this attribute shall be a valid representation of an integer in the range 0 to15 (see 15.17);

b) **minor** (required) – the value of this attribute shall be a valid representation of an integer in the range 0 to 15.

15.13.2 Semantics

15.13.2.1 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.

15.13.2.2 The **major** attribute represents the major version number (2 in this version).

15.13.2.3 The **minor** attribute represents the minor version number (0 in this version).

15.13.2.4 If this element is not present, the attribute values **major="2" minor="0"** are implied.

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

NOTE – Thus, the **<cbeff-version>** element is normally omitted from all child **<bir>** elements, as it would be redundant.

15.14 Element <bir-info>

15.14.1 Syntax

15.14.1.1 This element shall have the following attributes:

a) **integrity** (required) – the value of this attribute shall be one of the character strings in the third cell of the corresponding row of Table 15.1;

b) **creation-date** (optional) – the value of this attribute shall be a valid representation of a date and time of the day (see 15.19);

c) **not-valid-before** (optional) – the value of this attribute shall be a valid representation of a date and time of the day;

d) **not-valid-after** (optional) – the value of this attribute shall be a valid representation of a date and time of the day.

15.14.1.2 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 15.20), 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.

15.14.2 Semantics

15.14.2.1 The **<bir-info>** 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 **<bir-info>** element is inherited by those child BIRs except where overridden by a corresponding attribute or child element of the **<bir-info>** 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** attribute is required and the **<bir-info>** element is mandatory in all **<bir>** elements, inheritance of the **integrity** attribute can never occur.

15.14.2.2 The **integrity** attribute 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 **<bir-info>** 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.

15.14.2.3 If the value of the **integrity** attribute is "**true**", then the parent **<bir>** element of this **<bir-info>** element shall have a child **<sb>** element.

15.14.2.4 Table 15.1 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 15.10.7).

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

Table 15.1 – BIR information

CBEFF data element name	XML attribute or element	Supported abstract values and encodings	Reference
CBEFF_BIR_integrity_options	integrity	The following abstract values are supported. The abstract values shall be encoded as shown below. NO INTEGRITY: "**false**" INTEGRITY: "**true**"	
CBEFF_BIR_creation_date	creation-date	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 15.19.	
CBEFF_BIR_validity_period (lower end)	not-valid-before	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 15.19.	
CBEFF_BIR_validity_period (upper end)	not-valid-after	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 15.19.	
CBEFF_BIR_creator	<creator>	All ISO/IEC 10646 character strings are supported. The character string shall be encoded as the string itself.	
CBEFF_BIR_index	<index>	All well-formed UUIDs are supported. The UUIDs shall be encoded as specified in 15.20. Shall not inherit its value from any other BIR level.	
CBEFF_BIR_payload	<payload>	All octet strings are supported. The octet strings shall be encoded as specified in 15.18. Shall not inherit its value from any other BIR level.	

15.15 Element <bdb-info>

15.15.1 Syntax

15.15.1.1 This element shall have the following attributes:

a) **`format-owner`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1 to 65535 (see 15.17);

b) **`format-type`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1 to 65535;

c) **`encryption`** (optional) – the value of this attribute shall be one of the character strings in the third cell of the corresponding row of Table 15.2;

d) **`creation-date`** (optional) – the value of this attribute shall be a valid representation of a date and time of the day (see 15.19);

e) **`not-valid-before`** (optional) – the value of this attribute shall be a valid representation of a date and time of the day;

f) **`not-valid-after`** (optional) – the value of this attribute shall be a valid representation of a date and time of the day;

g) **`type`** (optional) – the value of this attribute shall be one of the character strings in the third cell of the corresponding row of Table 15.2;

h) **`subtype`** (optional) – the value of this attribute shall be one of the character strings in the third cell of the corresponding row of Table 15.2;

i) **`level`** (optional) – the value of this attribute shall be one of the character strings in the third cell of the corresponding row of Table 15.2;

j) **`product-owner`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535 (see 15.17);

k) **`product-type`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535;

l) **`capture-device-owner`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535 (see 15.17);

m) **`capture-device-type`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535;

l) **`feature-ext-alg-owner`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535 (see 15.17);

m) **`feature-ext-alg-type`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535;

l) **`comparison-alg-owner`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535 (see 15.17);

m) **`comparison-alg-type`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535;

l) **`quality-alg-owner`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535 (see 15.17);

m) **quality-alg-type** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535;

l) **compression-alg-owner** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535 (see 15.17);

m) **compression-alg-type** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1..65535;

n) **purpose** (optional) – the value of this attribute shall be one of the character strings in the third cell of the corresponding row of Table 15.2;

o) **quality** (optional) – the value of this attribute shall be a valid representation of an integer in the range –2..100 (see 15.17), as specified in the third cell of the corresponding row of Table 15.2.

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

a) an optional **<challenge-response>** element – the content of this element shall be a valid representation of an octet string (see 15.18);

b) an optional **<index>** element – the content of this element shall be a valid representation of a universally unique identifier (see 15.20).

15.15.1.3 If the parent **<bir>** element has a child **<bdb>** element, then the **encryption** attribute shall be present in this **<bdb-info>** element unless it is present in the child **<bdb-info>** element of an ancestor **<bir>** element (see also 15.11.1.4).

15.15.1.4 If the parent **<bir>** element has a child **<bdb>** element, then the **format-owner** attribute shall be present in this **<bdb-info>** element unless it is present in the child **<bdb-info>** element of an ancestor **<bir>** element (see also 15.11.1.4).

15.15.1.5 If the parent **<bir>** element has a child **<bdb>** element, then the **format-type** attribute shall be present in this **<bdb-info>** element unless it is present in the child **<bdb-info>** element of an ancestor **<bir>** element (see also 15.11.1.4).

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

15.15.2 Semantics

15.15.2.1 If the BIR has a BDB (the **<bir>** element has a child **<bdb>** element), then the **<bdb-info>** element carries information about that BDB. Otherwise, the information carried by the attributes and child elements of the **<bdb-info>** 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 **<bdb-info>** 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).

15.15.2.2 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 **<bdb-info>** element or by having the BIR inherit that attribute value from its parent BIR), then the BDB in the **<bdb>** element shall be encrypted.

15.15.2.3 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 **<bir-info>** 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.

15.15.2.4 Table 15.2 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 15.10.7).

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

Table 15.2 – BDB information

CBEFF data element name	XML attribute or element	Supported abstract values and encodings	Reference
CBEFF_BDB_format_owner	format_owner	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_format_type	format_type	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
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	creation_date	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 15.19.	
CBEFF_BDB_validity_period (lower end)	not-valid-before	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 15.19.	
CBEFF_BDB_validity_period (upper end)	not-valid-after	All date and time-of-the-day abstract values permitted by CBEFF are supported. The abstract values shall be encoded as specified in 15.19.	
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**" DNA: "**dna**" EAR: "**ear**"	

CBEFF data element name	XML attribute or element	Supported abstract values and encodings	Reference
		FACE: "**face**" FINGER: "**finger**" FOOT: "**foot**" VEIN: "**vein**" HAND GEOMETRY: "**hand-geometry**" IRIS: "**iris**" RETINA: "**retina**" VOICE: "**voice**" GAIT: "**gait**" KEYSTROKE: "**keystroke**" LIP MOVEMENT: "**lip-movement**" SIGNATURE OR SIGN: "**signature-sign**"	
CBEFF_BDB_biometric_subtype	subtype	The following abstract values are supported. The abstract values shall be encoded as shown below. LEFT: "**left**" RIGHT: "**right**" LEFT THUMB: "**left-thumb**" LEFT POINTER FINGER: "**left-pointer**" LEFT MIDDLE FINGER: "**left-middle**" LEFT RING FINGER: "**left-ring**" LEFT LITTLE FINGER: "**left-little**" RIGHT THUMB: "**right-thumb**" RIGHT POINTER FINGER: "**right-pointer**" RIGHT MIDDLE FINGER: "**right-middle**" RIGHT RING FINGER: "**right-ring**" RIGHT LITTLE FINGER: "**right-little**" LEFT PALM: "**left-palm**" LEFT BACK OF HAND:	

CBEFF data element name	XML attribute or element	Supported abstract values and encodings	Reference
		"**left-back-of-hand**" LEFT WRIST: "**left-wrist**" RIGHT PALM: "**right-palm**" RIGHT BACK OF HAND: "**right-back-of-hand**" RIGHT WRIST: "**right-wrist**"	
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_owner	product-owner	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_product_type	product-type	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_capture_device_owner	capture-device-owner	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_capture_device_type	capture-device-type	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_feature_extraction_algorithm_owner	feature-ext-alg-owner	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_feature_extraction_algorithm_type	feature-ext-alg-type	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_comparison_algorithm_owner	comparison-alg-owner	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_comparison_algorithm_type	comparison-alg-type	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_quality_algorithm_owner	quality-alg-owner	All integers in the range 1 to 65535 are supported. The integers shall be encoded as	

CBEFF data element name	XML attribute or element	Supported abstract values and encodings	Reference
		specified in 15.17.	
CBEFF_BDB_quality_algorithm_type	quality-alg-type	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_compression_ algorithm_owner	compression-alg-owner	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_BDB_compression_ algorithm_type	compression-alg-type	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
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**" ENROLL FOR VERIFICATION ONLY: "**enroll-verify**" ENROLL FOR IDENTIFICATION ONLY: "**enroll-identify**" AUDIT: "**audit**"	
CBEFF_BDB_quality	quality	The following abstract values are supported. The integers shall be encoded as specified in 15.17. The other abstract values shall be encoded as shown below. INTEGER QUALITY NOT SUPPORTED BY BDB CREATOR: "**-2**" QUALITY SUPPORTED BY BDB CREATOR BUT NOT SET: "**-1**"	
CBEFF_BDB_challenge_response	<challenge-response>	All octet strings are supported. The octet strings shall be encoded as specified in 15.18. Shall appear only in BIRs that have a BDB.	
CBEFF_BDB_index	<index>	All well-formed UUIDs are supported. The UUIDs shall be encoded as specified in 15.20 Shall appear only in BIRs that have a BDB.	

15.16 Element <sb-info>

15.16.1 Syntax

15.16.1.1 This element shall have the following attributes:

a) **`format-owner`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1 to 65535 (see 15.17);

b) **`format-type`** (optional) – the value of this attribute shall be a valid representation of an integer in the range 1 to 65535

and shall have an empty content.

15.16.1.2 If the parent **`<bir>`** element has a child **`<sb>`** element, then the **`format-owner`** attribute shall be present in this **`<sb-info>`** element unless it is present in the child **`<sb-info>`** element of an ancestor **`<bir>`** element (see also 15.11.1.5).

15.16.1.3 If the parent **`<bir>`** element has a child **`<sb>`** element, then the **`format-type`** attribute shall be present in this **`<sb-info>`** element unless it is present in the child **`<sb-info>`** element of an ancestor **`<bir>`** element (see also 15.11.1.5).

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 attributes of the **`<sb-info>`** element, the **`<sb-info>`** element will have no attributes and an empty content. Omission of the **`<sb-info>`** element is not allowed in this case (see 15.11.1.5).

15.16.2 Semantics

15.16.2.1 If the BIR has an SB (the **`<bir>`** element has a child **`<sb>`** element), then the **`<sb-info>`** 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 **`<sb-info>`** element is inherited by those child BIRs except where overridden by a corresponding child element of the **`<sb-info>`** 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).

15.16.2.2 Table 15.3 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 15.10.7).

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

Table 15.3 – SB information

CBEFF data element name	XML attribute or element	Supported abstract values and encodings	Reference
CBEFF_SB_format_owner	format-owner	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	
CBEFF_SB_format_type	format-type	All integers in the range 1 to 65535 are supported. The integers shall be encoded as specified in 15.17.	

15.17 Representation of Integers

15.17.1 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.

15.17.2 A negative integer shall be represented as the corresponding positive integer, preceded by a HYPHEN-MINUS character ("**-**").

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

15.18 Representation of Octet Strings

15.18.1 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.

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

15.19 Representation of Date and Time of the Day

15.19.1 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.

15.19.2 The encoding shall be the concatenation of three or more of the following components (in order):

a) the "year" component, consisting of the year encoded in four digits ("**2000**" to "**2999**") ;

b) the "month" component, consisting of the month encoded in two digits ("**01**" to "**12**");

c) the "day" component, consisting of the day encoded in two digits ("**01**" to "**31**");

d) the letter "**T**";

e) the "hour" component, consisting of the hour encoded in two digits ("**00**" to "**23**");

f) the "minute" component, consisting of the minute encoded in two digits ("**00**" to "**59**");

g) the "second" component, consisting of the second encoded in two digits ("**00**" to "**59**");

h) the letter "**Z**".

15.19.3 The "year", "month" and "day" components shall be present.

15.19.4 The letter "**T**" shall be present if and only if the "hour" component is present.

15.19.5 The "second" component shall only be present if the "minute" component is present, and the "minute" component shall only be present if the "hour" component is present.

15.19.6 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.

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

15.20 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

15.20.1 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; and

d) HYPHEN-MINUS ("**-**").

15.20.2 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).

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

15.21 Patron format conformance statement

15.21.1 Identifying information

Required Information	Patron format reference
Patron name	See 15.1
Patron identifier	See 15.2
Patron format name	See 15.3
Patron format identifier	See 15.4
Patron format ASN.1 object identifier	See 15.5
Domain of use description	See 15.6
Patron format version	See 15.7
CBEFF version	See 15.8

15.21.2 CBEFF-defined data elements and abstract values

CBEFF data element name	Mandatory/ optional	Patron format field name	Abstract values specified?	Encodings specified?
CBEFF_BDB_format_owner	Mandatory (specified or inherited) if a BDB is present	**format-owner** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_format_type	Mandatory (specified or inherited) if a BDB is present	**format-type** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_encryption_options	Mandatory (specified or inherited) if a BDB is present	**encryption** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BIR_integrity_options	Mandatory	**integrity** attribute of **<bir-info>**	Yes	Yes
CBEFF_BDB_subheader_count	Mandatory	implied in the number of occurrences of the child **<bir>** element	No (implied)	No (implied)
CBEFF_BDB_biometric_type	Optional	**type** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_biometric_subtype	Optional	**subtype** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_challenge_response	Optional	**<challenge-response>** child of **<bdb-info>**	Yes	Yes
CBEFF_BDB_creation_date	Optional	**creation-date** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_index	Optional	**<index>** child of **<bdb-info>**	Yes	Yes
CBEFF_BDB_product_owner	Optional	**product-owner** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_product_type	Optional	**product-type** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_capture_device_owner	Optional	**capture-device-owner** attribute of **<bdb-info>**	Yes	Yes

CBEFF data element name	Mandatory/ optional	Patron format field name	Abstract values specified?	Encodings specified?
CBEFF_BDB_capture_device_type	Optional	**capture-device-type** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_feature_extraction_algorithm_owner	Optional	**feature-ext-alg-owner** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_feature_extraction_algorithm_type	Optional	**feature-ext-alg-type** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_comparison_algorithm_owner	Optional	**comparison-alg-owner** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_comparison_algorithm_type	Optional	**comparison-alg-type** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_quality_algorithm_owner	Optional	**quality-alg-owner** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_quality_algorithm_type	Optional	**quality-alg-type** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_compression_algorithm_owner	Optional	**compression-alg-owner** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_compression_algorithm_type	Optional	**compression-alg-type** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_processed_level	Optional	**level** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_purpose	Optional	**purpose** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_quality	Optional	**quality** attribute of **<bdb-info>**	Yes	Yes
CBEFF_BDB_validity_period	Optional	**not-valid-before** and **not-valid-after** attributes of **<bdb-info>**	Yes	Yes
CBEFF_BIR_creation_date	Optional	**creation-date** attribute of **<bir-info>**	Yes	Yes