

## Recommendations for Revision of ANSI/NIST ITL 1-2000

### Report of CBEFF Working Group

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The CBEFF Working Group has developed the following recommendations:

1. Support multiple biometric types by adding Record Type-18. This record conforms to INCITS 398-2005, the Common Biometric Exchange Formats Framework (CBEFF).
2. Include an informative annex to provide example(s) of the implementation of the proposed CBEFF Data Record.
3. Add optional fields to Type-10, and Type-13 through Type-16, that allow those types to conform to the requirements of CBEFF.

Text for insertion in the revised ITL 1-2000 follows:

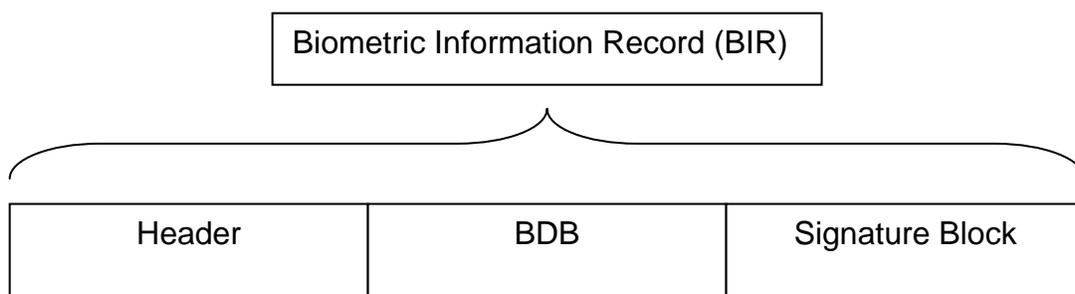
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## CBEFF Data Record - Suggested Text

### A. Type-18 CBEFF data record

The Type-18 tagged-field logical record shall contain and be used to exchange biometric data by using a format that conforms to INCITS 398-2005, the Common Biometric Exchange Formats Framework (CBEFF).

A CBEFF compliant Biometric Information Record (BIR) is made up of a Header, a Biometric Data Block (BDB), and an optional Signature Block (which is not used in the Type-18 logical record). A BIR is often shown as follows, but the ordering of components is not specified by the CBEFF standard. While the exact format of the BIR is not specified in the CBEFF standard, the Type-18 logical record is one instance of a specification that defines an exact format.



Two mandatory fields in the CBEFF Header are Format Owner and Format Type. The Format Owner field denotes the vendor, standards body, working group, or industry consortium that has defined the format of the biometric data (the data contained in the BDB). A CBEFF requirement is that format owners register with the International Biometric Industry Association (IBIA) for an assigned identifier of the format owner. The values used in the Format Type field are assigned by the format owner and represent a specific BDB format as specified by the format owner. This may be a non-standard, unpublished data format or a data format that has been standardized by an industry group, consortium, or standards body. It is the combined CBEFF Format Owner/Format Type value that uniquely identifies the BDB format.

The Type-18 logical record provides the CBEFF fields necessary for users to send, receive, and interpret biometric data in any registered BDB format. The data carried in the Biometric Data field (18.999) is the BDB. The format of that data is identified by the fields BDB Format Owner and BDB Format Type as described by the CBEFF standard.

A Type-18 record is capable of carrying the data of any biometric modality as long as it is identified by a BDB Format Owner and BDB Format Type.

#### A.1 Fields for the Type-18 logical record

The following paragraphs describe the data contained in each of the fields for the Type-18 logical record. Within a Type-18 logical record, entries shall be provided in numbered fields. It

is required that the first two fields of the record are ordered, and the field containing the CBEFF formatted binary data shall be the last physical field in the record. For each field of the Type-18 record, Table 1 lists the “condition code” as being mandatory “M” or optional “O”, the field number, the field name, character type, field size, and occurrence limits. Based on a three-digit field number, the maximum byte count size for the field is given in the last column. As more digits are used for the field number, the maximum byte count will also increase. The two entries in the “field size per occurrence” include all character separators used in the field. The “maximum byte count” includes the field number, the information, and all the character separators including the “GS” character.

**Table 1. Type-18 CBEFF Data Record Layout**

Ident	Cond Code	Field Number	Field Name	Char Type	Field size per occurrence		Occur count		Max byte count
					min	max	min	max	
LEN	M	18.001	LOGICAL RECORD LENGTH	N	4	10	1	1	15
IDC	M	18.002	IMAGE DESIGNATION CHARACTER	N	2	5	1	1	12
RSV	-	18.003 18.099	RESERVED FOR FUTURE INCLUSION	--	--	--	--	--	--
HDV	M	18.100	CBEFF HEADER VERSION	N	5	5	1	1	12
BTY	M	18.101	BIOMETRIC TYPE	N	9	9	1	1	16
BDQ	M	18.102	BIOMETRIC DATA QUALITY	AN	2	4	1	1	11
BFO	M	18.103	BDB FORMAT OWNER	AN	5	5	1	1	12
BFT	M	18.104	BDB FORMAT TYPE	AN	5	5	1	1	12
RSV	-	18.105 18.199	RESERVED FOR FUTURE INCLUSION	--	--	--	--	--	--
UDF	O	18.200 18.998	USER-DEFINED FIELDS	--	--	--	--	--	--
BDB	M	18.999	BIOMETRIC DATA	B	2	--	1	1	--

**A.1.1 Field 18.001: Logical Record Length (LEN)**

This mandatory ASCII field shall contain the total count of the number of bytes in the Type-18 logical record. This field shall specify the length of the record including every character of every field contained in the record and the information separators.

**A.1.2 Field 18.002: Image Designation Character (IDC)**

This mandatory ASCII field shall be used to identify the CBEFF data contained in the record. This IDC shall match the IDC found in the file content (CNT) field of the Type-1 record.

**A.1.3 Field 18.003-099: Reserved for Future Definition (RSV)**

These fields are reserved for inclusion in future revisions of this standard. None of these fields are to be used at this revision level. If any of these fields are present, they are to be ignored.

**A.1.4 Field 18.100: CBEFF Header Version (HDV)**

This mandatory ASCII field shall be used to identify the version of CBEFF specification that this record conforms to. The format is two characters for major version number followed by two characters for minor version. The current version of CBEFF is INCITS 398-2005 represented by the string '0101' (major version '01' and minor version '01').

**A.1.5 Field 18.101: Biometric Type (BTY)**

This mandatory ASCII field shall be used to identify the type of biometric technology. This specification adopts the values presented in CBEFF Table 4 with the addition of two leading zeros for future expansion. The resulting table is shown in Table 2.

**Table 2. Biometric Type**

Biometric Type name	Biometric Type code
No Information Given	'0000000'
Multiple Biometrics Used	'0000001'
Facial Features	'0000002'
Voice	'0000004'
Fingerprint	'0000008'
Iris	'0000010'
Retina	'0000020'
Hand Geometry	'0000040'
Signature Dynamics	'0000080'
Keystroke Dynamics	'0000100'
Lip Movement	'0000200'
Thermal Face Image	'0000400'
Thermal Hand Image	'0000800'
Gait	'00001000'
Body Odor	'00002000'
DNA	'00004000'
Ear Shape	'00008000'
Finger Geometry	'00010000'
Palm Print	'00020000'
Vein Pattern	'00040000'
Foot Print	'00080000'

**A.1.6 Field 18.102: Biometric Data Quality (BDQ)**

This mandatory ASCII field shall be used to specify the quality of the data in the BDB. This value shall be within the range of 0 through 100 where 100 is the highest quality. To support ANSI INCITS 358, the BioAPI standard (see Section 2.1.46 BioAPI\_QUALITY), the values in Table 3 shall also be allowed:

**Table 3. Biometric Data Quality**

Biometric Data Quality description	Biometric Data Quality code
Quality not supported	'NSu'
Quality supported but not set	'NSE'

**A.1.7 Field 18.103: BDB Format Owner (BFO)**

In a CBEFF structure the BDB Format Owner and Format Type, when used in combination, uniquely identify the specific format of the BDB content. The format and content of the BDB is “owned” by the CBEFF Client (see Clause 6.1 of the CBEFF standard). This BDB format definition may be published (public) or unpublished (non-public).

This mandatory ASCII field shall be used to denote the vendor, standards body, working group, or industry consortium that has defined the format of the Biometric Data (in the BDB). A CBEFF requirement is that format owners register with IBIA for an assigned identifier of the format owner. The number is guaranteed to be unique. Refer to Clause 6. CBEFF Patrons and Clients, of the CBEFF standard, for registration information.

The 4 hex digits assigned by IBIA shall be represented by a string of 4 ASCII characters.

**A.1.8 Field 18.104: BDB Format Type (BFT)**

This mandatory ASCII field shall be used to identify the value assigned by the format owner to represent the specific BDB Format as specified by the format owner. This may be a non-standard, unpublished data format or a data format that has been standardized by an industry group, consortium, or standards body. The registration of the Format Type value is recommended but not required. Refer to Clause 6. CBEFF Patrons and Clients, of the CBEFF standard, for information about registration.

The 4 hex digits assigned by the format owner shall be represented by a string of 4 ASCII characters.

**A.1.9 Field 18.105-199: Reserved for Future Definition (RSV)**

These fields are reserved for inclusion in future revisions of this standard. None of these fields are to be used at this revision level. If any of these fields are present, they are to be ignored.

**A.1.10 Field 18.200-998: User-Defined Fields (UDF)**

These fields are user-definable fields. Their size and content shall be defined by the user and be in accordance with the receiving agency. If present, they shall contain ASCII textual information.

**A.1.11 Field 18.999: Biometric Data (BDB)**

This field shall contain the CBEFF Biometric Data Block (BDB). It shall always be assigned field number 999 and must be the last physical field in the record. For example, 18.999: is followed by an iris BDB in a binary representation.

### **A.2 End of Type-18 CBEFF Data Record**

For the sake of consistency, immediately following the last byte of data from field 18.999 an “FS” separator shall be used to separate it from the next logical record. This separator must be included in the length field of the Type-18 record.

### **A.3 Additional Type-18 CBEFF Data Records**

Additional Type-18 records may be included in the file. For each additional CBEFF record, a complete Type-18 logical record together with the “FS” separator is required.

# CBEFF Data Record - Suggested Informative Annex

## Annex A (Informative)

### Type-18 CBEFF Data Record Example

This example of a Type-18 CBEFF Data Record contains a Biometric Data Block (BDB) that is an INCITS 381-2004 standard finger image data record.

In this example, the content of the BDB assumes that the finger image is of a left index finger and that the image was captured using a live-scan device that conforms to the parameters listed under setting level '31' in table 1 of the INCITS 381-2004 standard. The image has pixel dimensions of 375 x 625 with a 500-pixel scanning resolution in both horizontal and vertical directions and will be formatted as uncompressed for the purpose of illustration. This example begins with a finger image that is 234,375 bytes long (as shown in the last row of Table 2 (bytes 51 through 234,425)) and adds the appropriate headers.

Table 1 lists the contents of the Type-18 CBEFF data record. The binary data in the BDB field of this record is expanded in Table 2.

**Table 1 – Type-18 CBEFF Data Record Example**

Field	Transaction Record	Byte Count
LEN	18.001:234519 <sup>G</sup> <sub>S</sub>	14
IDC	18.002:33 <sup>G</sup> <sub>S</sub>	10
HDV	18.100:0101 <sup>G</sup> <sub>S</sub>	12
BTY	18.101:00000008 <sup>G</sup> <sub>S</sub>	16
BDQ	18:102:80 <sup>G</sup> <sub>S</sub>	10
BFO	18.103:001B <sup>G</sup> <sub>S</sub>	12
BFT	18.104:0401 <sup>G</sup> <sub>S</sub>	12
BDB	18.999:<binary data> <sup>F</sup> <sub>S</sub> See Table 2	234,425 + 8
Total		234,519

The total byte count of this example data record is 234,519 as shown in the Length (LEN) field. The contents of the binary data portion of the BDB field are shown in Table 2. The remainder of the record is composed as follows:

- The Image Designation Character (IDC) field contains the example value of 33.
- The CBEFF Header Version (HDV) field identifies the version of the CBEFF standard specified in INCITS 398-2005 with the string '0101'.
- The Biometric Type (BTY) field represents fingerprint with the string '00000008'.
- The Biometric Data Quality (BDQ) field represents the example value of 80 with the string '80'.

- The CBEFF BDB Format Owner assigned to INCITS M1 is the 16-bit value 0x001B Hex. This is represented in the BFO field with the string '001B'.
- The CBEFF BDB Format Type code assigned by INCITS M1 to INCITS 381-2004 is the 16-bit value 0x0401 Hex. This is represented in the BFT field with the string '0401'.

**Table 2. ANSI/INCITS 381-2004 Data Example**

Subfield	Bytes	Values	Notes
Format identifier	1-4	46 49 52 00	"FIR" – Finger Image Record
Version number	5-8	30 31 30 00	"010"
Record length	9-14	00 00 00 03 93 B9	One finger view (36+1*(14+234,375) bytes)
CBEFF Product Identifier	15-18	43 21 DC BA	CBEFF PID
Capture Device	19-20	01 AB	Vendor specified
Image Acquisition Level	21-22	00 31	EFTS/F, 500 Pixels/inch
Number of fingers/palms	23	01	
Scale units	24	01	Pixels/inch
Scan resolution (horiz)	25-26	01 F4	500 pixels/inch
Scan resolution (vert)	27-28	01 F4	500 pixels/inch
Image resolution (horiz)	29-30	01 F4	500 pixels/inch
Image resolution (vert)	31-32	01 F4	500 pixels/inch
Pixel depth	33	08	256 gray levels
Image compression algorithm	34	00	Uncompressed
Reserved	35-36	00 00	
Length of finger data block	37-40	00 03 93 95	Includes header and image data block (234,389 bytes)
Finger/palm position	41	07	Left index finger
Count of views	42	01	
View number	43	01	
Finger/palm image quality	44	FE	Undefined – 254
Impression type	45	00	Live-scan plain
Horizontal line length	46-47	01 77	375 pixels per horizontal line
Vertical line length	48-49	02 71	625 horizontal lines
Reserved	50	00	Byte set to '0x00'
Finger/palm image data	51-234,425	--	Uncompressed image data (234,375 bytes)

The total byte count of this Biometric Data Block is 234,425.

## Additions to Other Logical Records - Suggested Text

<Table 1 provides information for the additional fields added to Type-10, and Type-13 through Type-16 >

Table 1 Additional Fields

Ident	Cond Code	Field Number	Field Name	Char Type	Field size per occurrence		Occur count		Max byte count
					min	max	min	max	
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...
HDV	O	xx.100	CBEFF HEADER VERSION	N	5	5	1	1	12
BTY	O	xx.101	BIOMETRIC TYPE	N	9	9	1	1	16
BDQ	O	xx.102	BIOMETRIC DATA QUALITY	AN	2	4	1	1	11
BFO	O	xx.103	BDB FORMAT OWNER	AN	5	5	1	1	12
BFT	O	xx.104	BDB FORMAT TYPE	AN	5	5	1	1	12
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...

<The following is the text for the additional fields added to Type-10, and Type-13 through Type-16. The XX in the following would be replaced by 10, 13, 14, 15, or 16 as appropriate >

### x.1.4 Field XX.100: CBEFF Header Version (HDV)

This optional ASCII field shall be used to identify the version of CBEFF specification that this record conforms to. The format is two characters for major version number followed by two characters for minor version. The current version of CBEFF is INCITS 398-2005 represented by the string '0101' (major version '01' and minor version '01').

Note that in able to claim conformance to this version of CBEFF, the optional fields XX.100 through XX.104 must be present (i.e., are mandatory).

### x.1.5 Field XX.101: Biometric Type (BTY)

This optional ASCII field shall be used to identify the type of biometric technology. This specification adopts the values presented in CBEFF Table 4 with the addition of two leading zeros for future expansion. The resulting table is shown in Table a.

**Table a. Biometric Type**

Biometric Type name	Biometric Type code
No Information Given	'00000000'
Multiple Biometrics Used	'00000001'
Facial Features	'00000002'
Voice	'00000004'
Fingerprint	'00000008'
Iris	'00000010'
Retina	'00000020'
Hand Geometry	'00000040'
Signature Dynamics	'00000080'
Keystroke Dynamics	'00000100'
Lip Movement	'00000200'
Thermal Face Image	'00000400'
Thermal Hand Image	'00000800'
Gait	'00001000'
Body Odor	'00002000'
DNA	'00004000'
Ear Shape	'00008000'
Finger Geometry	'00010000'
Palm Print	'00020000'
Vein Pattern	'00040000'
Foot Print	'00080000'

<in the sections for each individual type, the exact value could be specified here:

- Type-10 w/ Facial Image - '00000002' (Facial Features)
- Type-10 w/ SMT image - '00000000' (No Information Given)
- Type-13 Latent image - '00000008' (Fingerprint)
- Type-14 Tenprint - '00000008' (Fingerprint)
- Type-15 Palmprint image - '00020000' (Palm print)
- Type-16 User defined - include the table

>

**x.1.6 Field XX.102: Biometric Data Quality (BDQ)**

This optional ASCII field shall be used to specify the quality of the data in the BDB. This value shall be within the range of 0 through 100 where 100 is the highest quality. To support ANSI INCITS 358, the BioAPI standard (see Section 2.1.46 BioAPI\_QUALITY), the values in Table b shall also be allowed:

**Table b. Biometric Data Quality**

Biometric Data Quality description	Biometric Data Quality code
Quality not supported	'NSu'
Quality supported but not set	'NSe'

**x.1.7 Field XX.103: BDB Format Owner (BFO)**

In a CBEFF structure the BDB Format Owner and Format Type, when used in combination, uniquely identify the specific format of the BDB content. The format and content of the BDB is “owned” by the CBEFF Client (see Clause 6.1 of the CBEFF standard). This BDB format definition may be published (public) or unpublished (non-public).

This optional ASCII field shall be used to denote the vendor, standards body, working group, or industry consortium that has defined the format of the Biometric Data (in the BDB). A CBEFF requirement is that format owners register with IBIA for an assigned identifier of the format owner. The number is guaranteed to be unique. Refer to Clause 6. CBEFF Patrons and Clients, of the CBEFF standard, for registration information.

The 4 hex digits assigned by IBIA shall be represented by a string of 4 ASCII characters.

#### **x.1.8 Field XX.104: BDB Format Type (BFT)**

This optional ASCII field shall be used to identify the value assigned by the format owner to represent the specific BDB Format as specified by the format owner. This may be a non-standard, unpublished data format or a data format that has been standardized by an industry group, consortium, or standards body. The registration of the Format Type value is recommended but not required. Refer to Clause 6. CBEFF Patrons and Clients, of the CBEFF standard, for information about registration.

The 4 hex digits assigned by the format owner shall be represented by a string of 4 ASCII characters.

*< I am actively attempting to get BDB Format Type values assigned by INCITS M1 (M1 is a registered Format Owner) for each of Type-10, and Type-13 through Type-16. This would mean that the BDB Format Owner field would be equal to '001B' and that the exact value of BDB Format Type could be specified in this document in the appropriate section for each type.*

*NIST (specifically, Mr. Michael McCabe) is also a registered Format Owner. In this case, the BDB Format Owner field would be equal to '000F'.*

*>*

<additional information if required>

IBIA information:

International Biometric Industry Association  
Suite 370 South  
601 Thirteenth Street, N.W.  
Washington, D.C. 20005

List of registered Format Owner values:

[http://www.ibia.org/biometrics/formatregistry\\_registered.asp](http://www.ibia.org/biometrics/formatregistry_registered.asp)

To register new Format Owner values: <http://www.ibia.org/biometrics/formatregistry.asp>

CBEFF Reference:

INCITS 398-2005 - Information technology - Common Biometric Exchange Formats Framework (CBEFF).