Recommendations for Revision of ANSI/NIST ITL 1-2000

Type-17 Iris Data Logical Record

Iris Data Record - Suggested Text

A. Type-17 Iris data record

The Type-17 tagged-field logical record shall contain and be used to exchange iris image data. Generic iris images may exchanged using the mandatory fields of this record type which are entirely consistent with the mandatory fields of a Type-16 record. Additionally, the optional fields may be used to exchange the additional data available in the INCITS 379-2004 – Iris Image Interchange Format standard.

The INCITS 379-2004 standard specifies two alternative image interchange formats for biometric authentication systems that utilize iris recognition. The first is based on a rectilinear image storage format that may be a raw, uncompressed array of intensity values or a compressed format such as that specified by the JPEG standard. Images may be monochrome or color with 256 or more intensity levels (grey or per-color), and vary in size depending on field of view and compression.

The second format is based on a polar image specification that requires certain pre-processing and image segmentation steps, but produces a much more compact data structure that contains only iris information. The polar image may be either raw or compressed format.

A.1 Fields for the Type-17 logical record

The following paragraphs describe the data contained in each of the fields for the Type-17 logical record. Within a Type-17 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 iris binary data shall be the last physical field in the record. For each field of the Type-17 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-17 Iris 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	17.001	LOGICAL RECORD LENGTH	N	4	8	1	1	15
IDC	M	17.002	IMAGE DESIGNATION CHARACTER	N	2	5	1	1	12
	M	17.003	FEATURE IDENTIFIER	N	2	2	1	1	9
	M	17.004	MAKE/MODEL/SERIAL NUMBER	ANS	4	151	1	1	158
	M	17.005	IMAGE FORMAT	N	2	3	1	1	10
HLL	M	17.006	HORIZONTAL LINE LENGTH	N	4	5	1	1	12
VLL	M	17.007	VERTICAL LINE LENGTH	N	4	5	1	1	12
SLC	M	17.008	SCALE UNITS	N	2	2	1	1	9
HPS	M	17.009	HORIZONTAL PIXEL SCALE	N	2	5	1	1	12
VPS	M	17.010	VERTICAL PIXEL SCALE	N	2	5	1	1	12
CGA	M	17.011	COMPRESSION ALGORITHM	AN	5	7	1	1	14
BPX	M	17.012	BITS PER PIXEL	N	2	3	1	1	10
	O	17.013	IRIS IMAGE QUALITY	N	3	4	0	1	11
	O	17.014	ROTATION ANGLE OF EYE	AN	2	5	0	1	12
	O	17.015	ROTATION UNCERTAINTY	AN	2	5	0	1	15
	O	17.016	IMAGE PROPERTIES	N	7	7	0	1	14
	O	17.017	DEVICE UNIQUE IDENTIFIER	ANS	17	17	0	1	24
	O	17.018	GLOBAL UNIQUE IDENTIFIER	AN	7	7	0	1	14
	O	17.019	IMAGE TRANSFORMATION	N	2	2	0	1	9
RSV	O	17.020 - 17.199	RESERVED FOR FUTURE INCLUSION	--	--	--	--	--	--
UDF	O	17.200 - 17.998	USER-DEFINED FIELDS	--	--	--	--	--	--
	M	17.999	IRIS IMAGE	B	2	--	1	1	--

A.1.1 Field 17.001: Logical Record Length (LEN)

This mandatory field shall contain the total count of the number of bytes in the Type-17 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 17.002: Image Designation Character (IDC)

This mandatory field shall be used to identify the image 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 17.003: Feature Identifier (###)

This mandatory field shall contain an identifier for which eye is represented by the image in the record. An entry of “0” in this field indicates that the image in this record is undefined. An entry of “1” in this field indicates that the image in this record is of a right eye. An entry of “2” in this field indicates that the image in this record is of a left eye.

A.1.4 Field 17.004: Make/Model/Serial Number (###)

This mandatory field contains the make, model and serial number for the iris capture device. It shall consist of three information items. The make of the iris capture device shall be the first information item followed by the “US” separator character, the model of the iris capture device, a “US” separator character, and the serial number of the iris capture device. Each information item shall be 1 to 50 characters.

A.1.5 Field 17.005: Image Format (###)

This mandatory field shall contain the image format code. It shall be used to specify the type of image format used.

Code	Description
0	Undefined
2	Gray Scale (mono) raw image format
4	RGB (color) raw image format
6	RGB gray scale (mono) JPEG image format
8	RGB (color) JPEG image format

A.1.6 Field 17.006: Horizontal Line Length (HLL)

This mandatory field shall contain the number of pixels present on a single horizontal line of the transmitted image.

A.1.7 Field 17.007: Vertical Line Length (VLL)

This mandatory field shall contain the number of horizontal lines contained in the transmitted image.

A.1.8 Field 17.008 Scale units (SLC)

This mandatory field shall specify the units used to describe the image sampling frequency (pixel density). A "1" in this field indicates pixels per inch, or a "2" indicates pixels per centimeter. A "0" in this field indicates no scale is given. For this case, the quotient of HPS/VPS gives the pixel aspect ratio.

A.1.9 Field 17.009 Horizontal pixel scale (HPS)

This mandatory field shall specify the integer pixel density used in the horizontal direction providing the SLC contains a "1" or a "2". Otherwise, it indicates the horizontal component of the pixel aspect ratio.

A.1.10 Field 17.010 Vertical pixel scale (VPS)

This mandatory field shall specify the integer pixel density used in the vertical direction providing the SLC contains a "1" or a "2". Otherwise, it indicates the vertical component of the pixel aspect ratio.

A.1.11Field 17.011 Compression algorithm CGA)

This mandatory field shall specify the algorithm used to compress the image. An entry of "NONE" in this field indicates that the data contained in this record is uncompressed. The domain registrar maintains a registry of acceptable compression techniques and corresponding codes.

A.1.12 Field 17.012: Bits Per Pixel (BPX)

This mandatory field shall contain the number of bits used to represent a pixel.

A.1.13 Field 17.013: Iris Image Quality (###)

This optional field shall indicate the image quality value. This field is defined in ANSI-INCITS 379-2004 – Iris Image Interchange Format.

A.1.14 Field 17.014: Rotation Angle of Eye (###)

This optional field shall indicate the rotation angle of the eye. For rectilinear images, rotation angle = round (65536 * angle / 360) modulo 65536. The angle is measured in degrees from horizontal. The value "FFFF" indicates rotation angle of eye is undefined. For polar images, entry shall be "FFFF".

A.1.15 Field 17.015: Rotation Uncertainty (###)

This optional field shall indicate the rotation uncertainty. The rotation uncertainty is equal to round (65536 * uncertainty / 180). The uncertainty is measured in degrees and is the absolute value of maximum error. The value "FFFF" indicates uncertainty is undefined.

A.1.6 Field 17.016: Image Properties (###)

This optional field shall contain the image property code. It shall contain six information items. The first information item shall indicate the specific horizontal orientation. The second information item shall indicate the specific vertical orientation. The third information item shall indicate the specific scan type. The fourth information item shall indicate the specific iris occlusions. The fifth information item shall indicate the specific occlusion filling. The last information item shall indicate the specific boundary extraction. Each information item shall be one character and be separated from the next by the "US" separator character. These subfields are defined in ANSI-INCITS 379-2004 – Iris Image Interchange Format.

Values for Horizontal Orientation shall be one of: "0" for Undefined, "1" for Base, or "2" for Flipped.

Values for Vertical Orientation shall be one of: "0" for Undefined, "1" for Base, or "2" for Flipped.

Values for Scan Type shall be one of: "0" for Undefined, "1" for Progressive, "2" for Interlace Frame, or "3" for Interlace Field.

Values for Iris Occlusions shall be one of: "0" for Undefined or "1" for Processed.

Values for Occlusion Filling shall be one of: “0” for Zerofill or “1” for Unitfill.

Values for Boundary Extraction shall be one of: “0” for Undefined or “1” for Processed.

A.1.17 Field 17.017: Device Unique Identifier (###)

This optional field shall contain a sixteen-byte string uniquely identifying the device or source of the data. This data can be one of: (1) Device Serial number, identified by the first character “D”, (2) Host PC Mac address, identified by the first character “M”, (3) Host PC processor ID, identified by the first character “P”, and (4) No serial number, identified by all zero’s.

A.1.18 Field 17.018: Global Unique Identifier (###)

This optional field shall contain a six-byte string to indicate a GUID – a globally unique identifier.

A.1.19 Field 17.019: Image Transformation (###)

This optional field shall specify the transformation type used in the record. A “0” in this filed indicates transformation type undefined, or a “1” indicates standard transformation type.

A.1.20 Field 17.020-199: 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.1.21 Field 17.200-998: 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.1.22 Field 17.999: Iris Image (###)

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-17 Iris Data Record

For the sake of consistency, immediately following the last byte of data from field 17.999 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-17 record.

A.3 Additional Type-17 Iris Data Records

Additional Type-17 records may be included in the file. For each additional iris record, a complete Type-17 logical record together with the *“FS”* separator is required.