



**ROMANIAN
STANDARD FOR THE INTERCHANGE
OF FINGERPRINT, PALMPRINT
FACIAL, LATENT & SMT
INFORMATION**

based on the

INTERPOL IMPLEMENTATION

of

ANSI/NIST-ITL 1-2000

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GLOSSARY

AFR	Automatic Fingerprint Recognition
ANSI	American National Standards Institute
CRO	Criminal Record Office / Criminal Reference Number
FBI	Federal Bureau of Investigation
ISO	International Standards Organization
INT-I	Interpol Implementation
NIST	National Institute of Standards and Technology

ANSI/NIST STANDARD: DATA FORMAT FOR THE INTERCHANGE OF FINGERPRINT, FACIAL & SMT INFORMATION

Interpol Implementation

Introduction

The ANSI/NIST Standard

In 1986 the American National Bureau of Standards published a standard to facilitate the interchange of fingerprint image information entitled "Data Format for the Interchange of Fingerprint Information" (ANSI/NBS-ICST 1-1986). Following a relatively exhaustive review procedure which included the UK Home Office and other US and Canadian law enforcement agencies, this was revised by the American National Institute of Standards and Technology (NIST) and issued as ANSI/NIST-CSL 1-1993. In 1997 the standard has been expanded to handle facial images and scar, mark and tattoo (SMT) image data. This expansion was issued as ANSI/NIST-ITL 1a-1997. In September 1998 both standards were revised and merged into the ANSI/NIST-ITL 1-2000 enhanced with additional field and record definitions.

As is often the case with standards such as these, it is defined fairly broadly so as to appeal to a large set of potential users. Hence, the standard provides some features not needed by some organizations. In addition, the standard also includes two user defined record types ("Type-2" and "Type-7") which are intentionally not defined within the standard, but rather are to be "user defined".

The present document, the Interpol Implementation (INT-I), has been written with the intention of supplementing the ANSI/NIST publication for the guidance of members of the International Criminal Police Organization.

The INT-I has been drafted noting the following general points:

1. **Openness** The INT-I has been drafted to ensure openness and hence any subsequent systems using the INT-I are assured the highest level of inter-operability.
2. **Non-intrusiveness** The INT-I has been drafted with a minimum level of mandatory requirements and many optional elements. There is no attempt to impose operational procedures and constraints on any system which conforms with the INT-I.
3. **Inter-operability** The INT-I allows for the transfer of fingerprint information between different systems. However, in a situation where there is an incompatibility between the two (transmitter and receiver), it is the responsibility of the transmitter to ensure that the transmitted data is re-formatted to comply with the receiving system.
4. **Wide usage** The INT-I has been designed to encompass the exchange of a wide variety of fingerprint information, and not just that required by an AFR system. For example, it is

envisaged that the INT-I could be used to transfer information such as the impressions from wrists and toes.

It should be noted that the records described in the ANSI/NIST standard and INT-I are not intended for manual entry and interpretation: rather they are intended for transmission of information between computers.

It is also important to note that some TOTs, and fields within records, may not be appropriate for certain transactions between particular agencies. For example, many agencies may not allow a remote site to add a record to its database, or there may be national legal objections to sending respondent images over a wide area network before they had been verified. However, in the spirit of open standards, and with the aim of excluding only the absolute minimum of information exchange, all such transactions are specified in INT-I but with the expectation that they would be blocked by the systems involved.

The following section describes the general structure of the ANSI/NIST standard and goes on to describe the various record types (Type-1, Type-2, ...). In addition this section also details the use of each of the record types.

The Romanian Interface Control Document

Following approval by the European Commission of the Phare 2002 programme, on 6 August 2003 began the implementation of the Twinning Project carried out by the National Refugee Office in Romania together with similar institutions in Germany and Greece, with the title of “**Further development of legal practice and institutional framework in the area of asylum and refugees**”. The larger objective of this Twinning Project is to assist Romania in harmonising the national legislation and standards with the EU *acquis* in the area of asylum in order to prepare Romanian institutions involved in the management of asylum and migration for EU accession. The EURODAC component of the Twinning project foresees the creation and implementation of a **Master Plan for the introduction of the EURODAC system in Romania**.

The working group consists also of EU experts Wolfgang Krodel and Matthias Memmesheimer, AFIS and Eurodac experts on behalf of BKA, Germany, as well as Romanian experts from the General Inspectorate of the Romanian Police – AFIS Service and the Centre for Communication and Informatics, the Directorate for Communication and Informatics, the General Inspectorate of the Border Police and the Special Telecommunications Service, as partners of the National Refugee Office and the German Federal Office for Migration and Refugees under the Eurodac Component of the Twinning Project.

Taking into account the mandatory prerequisite for connecting Romania to the central EURODAC system in Luxemburg, namely the functionality of receiving and processing ANSI/NIST files (based on the Interpol implementation and the EURODAC Interface Control Document) by the central AFIS at the Criminalistic Institute and the fact that the current AFIS does not meet these requirements, this “AFIS Interface control document based on the INTERPOL IMPLEMENTATION of the ANSI/NIST standard ITL 1-2000” was created, following the proposal and experience of the German experts.

This document concerning the ANSI/NIST standard (interface control document) for the electronic transmission of fingerprints will be submitted for approval to the MAI management in order to allow for its definition as professional standard of the ministry in a first stage, and to determine, according to the requirements of SIS2, if it can be adopted as a national standard.

File Content Overview

A fingerprint file, as specified in the ANSI/NIST-ITL 1-2000 standard, consists of several logical records. There are sixteen types of record. Appropriate ASCII separation characters are used between each record and the fields and subfields within the records. For the Romanian Implementation only 8 records are used.

1. File header

This record contains routing information and information describing the structure of the rest of the file. This record type also defines the types of transaction which fall under the following broad categories:

- ten-print services
- scene-of-crime and latent fingerprint services
- fingerprint image services and messaging
- scar, mark, tattoo and facial image services
- palm print services

It should be noted that the particular transaction types allowed in Section 1 are typical of the transactions carried out by Interpol members and may be different from those used elsewhere.

2. Descriptive text (user defined)

This record contains user-defined textual information of interest to the sending and receiving agencies. Section 2 describes the contents of the various fields and sub-fields within this record.

4. High resolution grey-scale image

This record is used to exchange high resolution grey-scale (eight bit) fingerprint images sampled at 500 to 520 pixels/inch. It is common practice to compress the fingerprint images using the WSQ algorithm. Other compression algorithms shall not be used.

8. Signature image

This record is used to transmit the signature of the fingerprinting officer or the fingerprinted subject. The ANSI/NIST standard allows for the fingerprint image to be uncompressed binary, compressed binary or vectorized format.

10. Facial and/or SMT Binary Image Record

Type-10 records shall contain facial and/or SMT binary image data and related ASCII information pertaining to the specific image contained in this record. It shall be used to exchange both greyscale and colour image data. Image data contained in the Type-10 record may be uncompressed or compressed.

13. Variable-Resolution Latent Image Record

Type-13 tagged field image records shall be used to exchange variable-resolution latent fingerprint and latent palmprint images together with textural alphanumerical information. The scanning resolution of the images shall be 500 pixels/inch with 256 grey-levels. If the quality of the latent image is sufficient it shall be compressed using WSQ-algorithm. If necessary the resolution of the images may be expanded to more than 500 pixels/inch and more than 256 grey-levels on bilateral agreement.

14. Variable-Resolution Tenprint fingerprint impressions

This record is used to exchange variable-Resolution resolution fingerprint images sampled at 500 or more pixels/inch and more than 256 gray-levels. This record shall only be used on bilateral agreement in addition to Type-4 records.

15. Variable-Resolution Palmprint Image Record

Type-15 tagged field image records shall be used to exchange variable-resolution palmprint images together with textural alphanumerical information. The scanning resolution of the images shall be 500 pixels/inch with 256 grey-levels. To minimize the amount of data all palmprint images shall be compressed using WSQ-algorithm. If necessary the resolution of the images may be expanded to more than 500 pixels/inch and more than 256 grey-levels on bilateral agreement.

Record format

A transaction file shall consist of one or more logical records. For each logical record contained in the file, several information fields appropriate to that record type shall be present. Each information field may contain one or more basic single-valued information items. Taken together these items are used to convey different aspects of the data contained in that field. An information field may also consist of one or more information items grouped together and repeated multiple times within a field. Such a group of information items is known as a subfield. An information field may therefore consist of one or more subfields of information items.

1. *Information separators*

In the tagged-field logical records (Type-1, Type-2, and Type-9 through Type-15), mechanisms for delimiting information are implemented by use of the four ASCII information separators. The de-limited information may be items within a field or subfield, fields within a logical record, or multiple occurrences of subfields. These information separators are defined in the standard ANSI X3.4. These characters are used to separate and qualify information in a logical sense. Viewed in a hierarchical relationship, the File Separator “FS” character is the most inclusive followed by the Group Separator “GS”, the Record Separator “RS”, and finally the Unit Separator “US” characters. Table 1 lists these ASCII separators and a description of their use within this standard.

Information separators should be functionally viewed as an indication of the type data that follows. The “US” character shall separate individual information items within a field or subfield. This is a signal that the next information item is a piece of data for that field or subfield. Multiple subfields within a field separated by the “RS” character signals the start of the next group of repeated information item(s). The “GS” separator character used between information fields signals the beginning of a new field preceding the field identifying number that shall appear. Similarly, the beginning of a new logical record shall be signalled by the appearance of the “FS” character.

These separators shall be in addition to any other symbols, punctuation, or delimiters as specified in this standard.

The four characters are only meaningful when used as separators of data items in the fields of the ASCII text records. There is no specific meaning attached to these characters occurring in binary image records and binary fields – they are just part of the exchanged data.

Normally, there should be no empty fields or information items and therefore only one separator character should appear between any two data items. The exception to this rule occurs for those instances where the data in fields or information items in a transaction are unavailable, missing, or optional, and the processing of the transaction is not dependent upon the presence of that particular data. In those instances, multiple and adjacent separator characters shall appear together rather than requiring the insertion of dummy data between separator characters.

Consider the definition of a field that consists of three information items. If the information for the second information item is missing, then two adjacent “US” information separator characters would occur between the first and third information items. If the second and third information

items were both missing, then three separator characters should be used – two “US” characters in addition to the terminating field or subfield separator character. In general, if one or more mandatory or optional information items are unavailable for a field or subfield, then the appropriate number of separator character should be inserted.

It is possible to have side-by-side combinations of two or more of the four available separator characters. When data are missing or unavailable for information items, subfields, or fields, there must be one fewer separator characters present than the number of data items, subfields, or fields required.

Table 1: Separators Used in NIST Data Files

Code	Type	Description	Hexadecimal Value	Decimal Value
US	Unit Separator	Separates information items	1F	31
RS	Record Separator	Separates subfields	1E	30
GS	Group Separator	Separates fields	1D	29
FS	File Separator	Separates logical records	1C	28

2. *Record layout*

For tagged-field logical records (Type-1, Type-2, Type-9, Type-10, and Type-13 through Type-16), each information field that is used shall be numbered in accordance with this standard. The format for each field shall consist of the logical record type number followed by a period “.”, a field number followed by a colon “:”, followed by the information appropriate to that field. The tagged-field number can be any one-to nine-digit number occurring between the period “.” and the colon “:”. It shall be interpreted as an unsigned integer field number. This implies that a field number of “2.123:” is equivalent to and shall be interpreted in the same manner as a field number of “2.000000123:”.

NOTE: For purposes of illustration throughout this document, a three-digit number shall be used for enumerating the fields contained in each of the tagged-field logical records described herein. Field numbers will have the form of “TT.xxx:” where the “TT” represents the one- or two-character record type followed by a period. The next three characters comprise the appropriate field number followed by a colon. Descriptive ASCII information or the image data follows the colon.

Logical Type-1, Type-2, and Type-9 records contain only ASCII textual data fields. The entire length of the record (including field numbers, colons, and separator characters) shall be recorded as the first ASCII field within each of these record types. The ASCII File Separator “FS” control character (signifying the end of the logical record or transaction) shall follow the last byte of ASCII information and shall be included in the length of the record.

In contrast to the tagged-field concept, the Type-3 through Type-8 records contain only binary data recorded as ordered fixed-length binary fields. The entire length of the record shall be recorded in the first four-byte binary field of each record. For these binary records, neither the record number with its period, nor the field identifier number and its following colon, shall be recorded. Furthermore, as all the field lengths of these six records are either fixed or specified,

none of the four separator characters (“US”, “RS”, “GS”, or “FS”) shall be interpreted as anything other than binary data. For these binary records, the “FS” character shall not be used as a record separator or transaction terminating character.

The Type-10 and Type-13 through Type-15 tagged-field image records combine ASCII fields with a single binary image field. Each ASCII field contains a numeric field identifier and its descriptive data. The last physical field in a tagged-field image record shall always be numbered 999 and shall contain the image data placed immediately following the colon (":") of the field identifier. The record length field shall contain the length of the record. The ASCII File Separator “FS” control character shall follow the last byte of the compressed or uncompressed image data. The “FS” character shall signify the end of the logical record or transaction and shall be included as part of the record length.

3. International character sets

All of the fields in the Type-1 transaction record must be recorded using the 7-bit ASCII code, which is the default character set code within a transaction. In order to effect data and transaction interchanges between non-English based agencies, a technique is available to encode information using character sets other than 7-bit ASCII. Fields from the Type-1 logical record and ASCII “LEN”, “IDC” and “SYS” text fields must still be encoded using 7-bit ASCII. But all other designated text fields can be encoded using alternate character sets. The general mechanism for accomplishing this provides for backward compatibility with existing readers, supports multiple character sets in a single text string, and handles internationally accepted character sets and text order conventions such as ISO character sets and Unicode.

To switch character sets within a transaction, the Type-1 record shall contain a field listing the Directory of Character Sets (DCS) used in the transaction. The DCS is an ordered list of 3 information items containing an identifying code, the name of an international character set, and its version. The code for a specific character set and other special codes shall be embedded in the transaction to signal the conversion to a different international character set. The ASCII Start-of-Text “STX” character (0x02) followed by the equal sign “=” is used to signal the change to an alternate character set defined by the specific DCS code that follows. The entire Start-of-Text sequence is terminated by a single instance of the ASCII End-of-Text “ETX” character (0x03). This alternate character set will remain active until a closing “ETX” character is encountered or the next ASCII information separator character is encountered.

The base-64 encoding scheme, found in email, shall be used for converting non-ASCII text into ASCII form. Annex 5 describes the use of the base-64 system. By convention, any language or character set text string following the Start-of-Text character sequence will be base-64 encoded for subsequent processing.

The field number including the period and colon, for example “2.001:”, in addition to the “US”, “RS”, “GS”, and “FS” information separators shall appear in the transaction as 7-bit ASCII characters without conversion to base-64 encoding.

All text between the STX sequence and the closing ETX character shall be encoded in base-64 notation. This is true even when the 7-bit ASCII character set is specified.

1 Type-1 Logical Record: the File Header

This record describes the structure of the file, the type of the file, and other important information.

The character set used for Type-1 fields shall contain only the 7-bit ANSI code for information interchange.

1.1 Fields for Type-1 Logical Record

1.1.1 Field 1.001: Logical Record Length (LEN)

This field contains the total count of the number of bytes in the whole Type-1 logical record. The field begins with "1.01:", followed by the total length of the record including every character of every field and the information separators.

1.1.2 Field 1.002: Version Number (VER)

To ensure that users know which version of the ANSI/NIST standard is being used, this four byte field specifies the version number of the standard being implemented by the software or system creating the file. The first two bytes specify the major version reference number, the second two the minor revision number. For example, the original 1986 Standard would be considered the first version and designated "0100" while the present standard is "0300".

1.1.3 Field 1.003: File Content (CNT)

This field lists each of the records in the file by record type and the order in which the records appear in the logical file. It consists of one or more subfields, each of which in turn contains two information items describing a single logical record found in the current file. The subfields are entered in the same order in which the records are recorded and transmitted.

The first information item in the first subfield is "1", to refer to this Type-1 record. It is followed by a second information item which contains the number of other records contained in the file. This number is also equal to the count of the remaining subfields of field 1.003.

Each of the remaining subfields is associated with one record within the file, and the sequence of subfields corresponds to the sequence of records. Each subfield contains two items of information. The first is to identify the Type of the record. The second is the record's IDC which is generally in the range 0-16 (one Type-1, one or two Type-2, and 14 Type-4), but could be much higher if additional records are included. The "US" character shall be used to separate the two information items.

1.1.4 **Field 1.004: Type of Transaction (TOT)**

This field contains a three letter mnemonic designating the type of the transaction. These codes are different from those used by other implementations of the standard.

APC (standard): Add To Print Collection. This transaction is used for sending a complete set of fingerprints, photos and if required a complete set of palms to a remote site, as a new record or to replace an existing record. These Transaction is used for a standard transmission from the booking stations to the AFIS workstation.

IRQ: Image Request. This transaction allows the fingerprint officer to retrieve fingerprints, palmprints and scenes of crime latents from an image database. It contains only sufficient information to enable the system to make a unique identification of the required prints or latents. For latents the Case Number (CNO), Sequence Number (SQN) and Latent Identifier (MID) must be specified, while for prints one of the following must be specified: Criminal Reference Number (CRO), Other Reference Number (ORN) or Miscellaneous Reference Number (MN1 to MN5).

IMR: Image Response. This transaction is for the transmission of a print or latent image from a collection, often in response to an IRQ transaction. The Type-2 record may contain textual information relevant to the image.

SRE: Search Results. This transaction contains a Type-1 and Type-2 record which detail the results of the search. The way fields are interpreted will depend on the original search request and to whom the search request was sent. If the SRE transaction is coming from an AFR system, the AFR system will specify a list of potential matches in the Respondents List (RLS). Additional information regarding the search, such as images and signatures can be attached to the record using Type-4, Type-7, Type-8 or Type-10 records.

USA: Add Latent to Unidentified Latents Collection. Besides containing the image of the latent being added to the database, or the image of a complete lift or photograph, the file includes a Type-2 record in which information is transmitted about the latent.

ERR: Error Message. This transaction is generated if the remote system has difficulty performing the transaction, e.g. if the unique reference number specified for an IRQ does not exist, or if a particular search is not allowed on the system. The Type-2 record will contain the error message. Which error messages are generated in what circumstances is an issue for the system designer.

The definition of these transactions implies that what appears to the officer performing a search as one transaction may, in fact, involve a number of separate transactions between the officer's workstation and the remote site.

It is likely that a system would be designed to block transactions initiated by a remote agency unless it had been specifically authorized by a senior user of the receiving agency.

One limitation of the standard is that it is not permissible for the file to have more than one transaction field. Thus if, say, a latent is to be searched against both the latents database and the prints database, two separate files must be sent.

Table 1.1 lists which records are permissible in the various transactions.

Table 1.1: Permissible Codes in Transactions

Transaction Type	Logical Record Type									
	1	2	4		8		10	13	14	15
IRQ	M	M	-		-		-	-	-	-
IMR	M	M	M		C		C		C	C
SRE	M	M	-		-		-	-	-	-
USA	M	M	-		-		-	M	-	-
APC	M	M	M		C		C	-	C	C
ERR	M	M	-		-		-	-	-	-

Key: M = Mandatory
 O = Optional
 - = Not allowed

1.1.5 **Field 1.005: Date of Transaction (DAT)**

This field indicates the date on which the transaction was initiated and must conform to the ISO standard notation of

YYYYMMDD

where YYYY is the year, MM is the month and DD is the day of the month. Leading zeros are used for single figure numbers. For example, "19931004" represents the 4 October 1993.

1.1.6 **Field 1.006: Priority (PRY)**

This optional field defines the priority, on a level of 1 to 9, with which the request is to be treated. "1" is the highest priority and "9" (the default if no priority field is present) the lowest. It is up to the receiving agency to define its policy on how each priority level is interpreted.

1.1.7 **Field 1.007: Destination Agency Identifier (DAI)**

This field specifies the destination agency for the transaction.

It consists of two information items in the following format

CC/agency.

The first information item contains the Interpol Country Code, defined in ISO 3166, two alpha-numeric characters long. The second item, *agency*, is a free text identification of the agency, up to a maximum of 32 alpha-numeric characters.

Destination Agency Identifier "ZZ/ALL" is reserved for transactions which shall be distributed by Interpol AFIS to all Interpol member states.

1.1.8 Field 1.008: Originating Agency Identifier (ORI)

This field specifies the file originator and has the same format as the DAI (Field 1.007).

1.1.9 Field 1.009: Transaction Control Number (TCN)

This is a control number for reference purposes. It should be generated by the computer and have the following format:

YYSSSSSSSSA

where YY is the year of the transaction, SSSSSSSS is an eight-digit serial number, and A is a check character generated by following the procedure given in Appendix 2. The originating agency has to ensure that the TCN is unique and that no other transaction of the agency will have the same TCN.

Where a TCN is not available, the field, YYSSSSSSSS, is filled with zeros and the check character generated as above.

1.1.10 Field 1.010: Transaction Control Response (TCR)

Where a request was sent out, to which this is the response, this optional field will contain the transaction control number of the request message. It therefore has the same format as TCN (Field 1.009).

Where a TCR is not available, the field, YYSSSSSSSS, is filled with zeros and the check character generated as in TCN (Field 1.009).

1.1.11 Field 1.011: Native Scanning Resolution (NSR)

This field specifies the normal scanning resolution of the system supported by the originator of the transaction. It allows the recipient of a search request to send the response(s) at either the minimum (or default) scanning rate of 19.68 pixels/mm (500 pixels/inch) or, if it has the ability, at the scanning rate of the system which made the request. The resolution is specified as two numeric digits followed by the decimal point and then two more digits (e.g. "20.00").

If both recipient and sender use the same native sampling resolution it may be more efficient and less error prone if both systems exchange images at their native sampling resolution rather than using the default rate specified in the standard.

The current ANSI/NIST standard allows any sampling rate from 500 to 520 pixels/inch, but the intention is for new systems to adopt 500 pixels/inch or 19.68 pixels/mm.

For applications other than fingerprint where resolution is not a factor or not applicable (such a facial or SMT image) this field shall be set to "00.00".

1.1.12 Field 1.012: Nominal Transmitting Resolution (NTR)

This five-byte field specifies the nominal transmitting resolution for the images being transmitted. The resolution is expressed in pixels/mm in the same format as NSR (Field 1.011)

For applications other than fingerprint where resolution is not a factor or not applicable (such a facial or SMT image) this field shall be set to "00.00".

1.1.13 Field 1.013: Domain name (DOM)

This mandatory field identifies the domain name for the user-defined Type-2 logical record implementation. If present, the domain name may only appear once within a transaction. It shall consist of one or two information items. The first information item will uniquely identify the agency, entity, or implementation used for formatting the tagged fields in the Type-2 record. An optional second information item will contain the unique version of the particular implementation. For this version of the Interpol-Implementation the value of the field shall be "INT-I{US}4.21{GS}".

1.1.14 Field 1.014: Greenwich mean time (GMT)

This mandatory field provides a mechanism for expressing the date and time in terms of universal Greenwich Mean Time (GMT) units. The GMT field contains the universal date that will be in addition to the local date contained in Field 1.005 (DAT). Use of the GMT field eliminates local time inconsistencies encountered when a transaction and its response are transmitted between two places separated by several time zones. The GMT provides a universal date and 24-hour clock time independent of time zones. It is represented as "CCYYMMDDHHMMSSZ", a 15-character string that is the concatenation of the date with the GMT and concludes with a "Z". The "CCYY" characters shall represent the year of the transaction, the "MM" characters shall be the tens and units values of the month, and the "DD" characters shall be the tens and units values of the day of the month, the "HH" characters represent the hour, the "MM" the minute, and the "SS" represents the second. The complete date shall not exceed the current date.

Field 1.015: Directory of character sets (DCS)

This optional field is a directory or list of character sets other than 7-bit ASCII that may appear within this transaction. This field shall contain one or more subfields, each with three information items. The first information item is the three-character identifier for the character set index number that references an associated character set throughout the transaction file. The second information item shall be the common name for the character set associated with that index number, the optional third information item is the specific version of the character set used. Table 1.2 lists the reserved named character sets and their associated 3-character index numbers. The "US" character shall separate the first information item from the second and the second from the third. The "RS" separator character shall be used between the subfields.

Table 1.2: Directory of character sets

Character set index	Character set name	Description
000	ASCII	7-bit English (Default)
001	ASCII	8-bit Latin
002	UNICODE	16-bit
003-127		Reserved for ANSI/NIST future use
128-999		User-defined character sets

2 Type-2 Logical Record: Descriptive Text

The structure of most of this record is not defined by the ANSI/NIST standard. The record contains information of specific interest to the agencies sending or receiving the file. To ensure that communicating fingerprint systems are compatible the INT-I requires that only the fields listed below are contained within the record. This document specifies which fields are mandatory and which optional, and also defines the structure of the individual fields.

Currently the numbers 001 to 085 have been assigned to specific fields. Numbers 086 to 199 are reserved for future additions to the INT-I. The fields above 2.200 are outside the scope of the INT-I and may be used for national requirements or by system implementers for information specific to their systems.

A file may contain only a small subset of these fields, depending on the transaction taking place.

The character set used for the first Type-2 record shall contain only the 7-bit ANSI code for information interchange. If the transaction contains a second Type-2 record this one may be used for information exchange with other character sets defined within Field 1.015.

2.1 Fields for Type-2 Logical Record

Fields 2.001 to 2.003 are mandatory in all records. They give essential information about the record.

2.1.1 Field 2.001: Logical Record Length (LEN)

This mandatory field contains the length of this Type-2 record, and specifies the total number of bytes including every character of every field contained in the record and the information separators.

2.1.2 Field 2.002: Image Designation Character (IDC)

The IDC contained in this mandatory field is an ASCII representation of the IDC as defined in the file content field of the Type-1 record.

2.1.3 Field 2.003: System Information (SYS)

This field is mandatory and contains four bytes which indicate which version of the INT-I this particular Type-2 record complies with. This feature gives the INT-I the ability to evolve as necessary while still allowing a system to process transactions generated by a system complying with an older version of the INT-I.

The first two bytes specify the major version number, the second two the minor revision number. For example, this implementation is version 4 revision 22 and would be represented as "0422".

2.1.12 Field 2.012: Miscellaneous Identification Number (MN1)

Any miscellaneous identification numbers may be entered in this and the following four fields (MN1 to MN5). Each of these fields may have a maximum length of 32 alpha-numeric characters.

The field MN1 is used to transmit the EURODAC-number.

Example: RO1041029ROLV02GL1012300

2.1.13 Field 2.013: Miscellaneous Identification Number (MN2)

The field MN2 is used to transmit the AFIS ID

2.1.19 Field 2.019: Date Fingerprinted (DPR)

This field consists of one subfield for each corresponding subfield in FNU (Field 2.017), and is intended to be used for both prints and latents.

For prints this field contains the date on which the subject was fingerprinted and refers to the date on which the prints included in the transaction were taken.

For latents this field specifies the date on which the latent was inspected at the scene of the crime by a scene examiner.

The format is the ISO standard of

YYYYMMDD

where YYYY is the year, MM is the month, and DD is the day, as explained in DAT (Field 1.005).

2.1.21 Field 2.021: Reason Fingerprinted (RFP)

This field consists of one subfield for each corresponding subfield in FNU (Field 2.017).

It is an alpha-numeric field with a maximum length of 128 alpha-numeric characters and is to allow the human operator to enter an extra message, for example giving further details of the reason for fingerprinting or information about how a search is to be carried out.

2.1.22 Field 2.022: Place Of Arrest (POA)

This field consists of one subfield for each corresponding subfield in FNU (Field 2.017).

Each subfield specifies the place of arrest, or the place where the fingerprints were taken, in the same format as DAI (Field 1.007).

2.1.23 Field 2.023: Owning Bureau (OBU)

This field consists of one subfield for each corresponding subfield in FNU (Field 2.017), and is intended for use with both prints and latents. The format of the field is the same as that used in POA (Field 2.022) and DAI (Field 1.007).

2.1.30 Field 2.030: Name (NAM)

This field contains the names of the subject. The format is:

family_name/name/name/ . . .

For instance Charles Peter Bell would appear as "BELL/CHARLES/PETER". If only the family name (surname) is known then this is followed by a single slash. The entire field is limited to 64 characters including the slashes. Spaces, apostrophes, hyphens and full stops that occur within a component name should be entered as such. If the name is longer than 64 characters the 64th character should be a plus sign. The plus sign can only be used in the final position.

2.1.31 Field 2.031: Maiden Name (MNA)

The format of this field is identical to NAM (Field 2.030), and is limited to 64 characters including the slashes. Spaces, apostrophes, hyphens and full stops that occur within a component name should be entered as such.

2.1.32 Field 2.032: Address (ADD)

This field contains the address of the subject, in free text up to 128 alpha-numeric characters. Format: country/county/city/street/number

2.1.34 Field 2.034: Aliases (AKA)

If present this field consists of at least one subfield. Each subfield is formatted as NAM (Field 2.030). Its use is identical to NAM.

2.1.35 Field 2.035: Date of Birth (DOB)

This field specifies the date of birth in ISO format:

YYYYMMDD

where YYYY is the year, MM is the month, and DD is the day, as explained in DAT (Field 1.005).

2.1.36 Field 2.036: Date of Birth Range (DBR)

Sometimes it will not be possible to specify the date of birth exactly. In such circumstances a date of birth range may be specified. The format of the field is

YYYYMMDDQYYYYMMDD

where the two strings YYYYMMDD are the two ISO dates defining the range, and Q is a qualifier, whose value is always 4, separating the two dates. Thus if the range is between 1st December 1995 and 31st January 1996, the field value will be « 19951201419960131 ».

The dates may include the wildcard character *, which can be used both if the start or end of the period is uncertain (eg. « *****419940101 ») and if the dates cannot be specified exactly (eg. 1992****419930101 »).

2.1.37 Field 2.037: Place of Birth (POB)

This field consists of up to three information items and specifies the place of birth.

The format is

CC/country/town

where CC is the Interpol Country Code, two alpha-numeric characters long, *country* is the free text equivalent, up to 32 characters long, and *town* is the free text name of the town of birth, up to 32 characters long.

2.1.38 Field 2.038: Nationality (NAT)

This field consists of up to two information items and specifies the nationality of the fingerprinted subject.

The format is

CC/nationality

where CC is the Interpol Country Code, two alpha-numeric characters long, and *nationality* is the free text equivalent, up to 32 characters long.

2.1.39 Field 2.039: Sex (SEX)

This is a single letter code representing the sex of the subject:

female	F
male	M
not certain	U

2.1.47 Field 2.047: Passport Number (PSP)

This field contains a passport number and is up to 32 alpha-numeric characters long.

2.1.49 Field 2.049: Occupation (OCC)

This field contains a free text description of the subject's occupation, and is up to 64 characters long.

2.1.50 Field 2.050: Warning (WNG)

This is a free text field of up to 32 alpha-numeric characters long, warning whether the subject is dangerous (for instance bears fire weapons, is violent, etc.).

2.1.51 Field 2.051: Modus Operandi (MDO)

This field contains a predefined list of the subject's normal modus operandi, and is up to 64 characters long.

Possible values are:

- Family abandonment
- Abuse in service
- Accident and railway catastrophe
- Illegal arrest and abusive investigation
- Association to commit crimes
- Poaching
- Begging
- Venereal disease contamination and AIDS transmission
- Smuggling
- Contract of consignment crimes
- Sexual corruption
- Bribing
- Embezzlement
- Desertion
- Destruction
- Copyright
- Escaping
- Tax evasion
- Forgery
- False declarations
- Forgery under accounting law
- Forging currency and other values
- Forging goods of the national cultural patrimony
- False identity
- Illegal use of company credit

- Use of forged documents with customs authorities
- Theft or qualified theft
- Theft from housing with matching key
- Theft from housing by annihilating alarm system
- Theft from housing by breaking door lock
- Theft from housing by escalating balcony, terrace, window
- Theft from housing by befriending
- Theft from companies
- Theft by breaking ATMs
- Theft by breaking vaults or metal closets
- Theft by using official qualities
- Theft by breaking holes into floors or ceilings
- Theft by breaking down walls
- Theft from pockets and bags
- Theft of and from cars – using matching keys
- Theft of and from cars – using lock breaking device
- Theft of and from cars – breaking open doors with crow bars or screw driver
- Theft of and from cars – breaking lateral or back windows
- Theft of and from cars – placing obstacles in front of garages
- Theft of and from cars – method of newspaper announcement
- Theft of and from cars – “full casco” method
- Theft of and from cars – breaking into trunk
- Theft of and from cars – using metal rod
- Theft of and from cars – puncturing tires
- Theft of and from cars – cutting open baffle cloth of trucks
- Theft of art objects from housing
- Theft from churches
- Theft from archaeological sites
- Fraudulent administration
- Incest
- Crime against public traffic regime
- Fraud
- Fraud – substitution of official qualities
- Fraud – forging documents
- Fraud – forging checks
- Fraud – fortune telling for money
- Fraud concerning quality of goods
- Internet fraud
- Gambling
- Illegal detainment
- Beating or injuring causing death
- Accepting bribes
- False testimony
- Not submitting health insurance in due time
- Negligence in service
- Not respecting regime of firearms and ammunition
- Homicide
- Homicide by shooting

- Homicide by using explosives
- Homicide by setting victim on fire
- Homicide by dissimulating traffic accident
- Homicide with sexual motive
- Homicide by mechanical asphyxiation
- Homicide by strangling
- Homicide by gassing victim
- Revenge homicide
- Homicide by poisoning
- Sexual perversions
- Tomb profanation
- Prostitution
- Prostitution – bars, clubs
- Prostitution – through mass media
- Prostitution – through “escort” agencies
- Prostitution – clients of massage parlours
- Soliciting/procuring
- Infanticide
- Infanticide by strangulation
- Infanticide by beating
- Infanticide by using cutting-stinging devices
- Infanticide by throwing infants into garbage bin
- Sexual intercourse with a minor
- Crimes against forest regime
- Bad treatment of minors
- Crimes against state security
- Blackmail
- Blackmail – protection tax
- Blackmail – detainment
- Blackmail – loan sharking
- Bad treatment
- Abstraction from levy
- Burglary
- Burglary from housing with tying up of victim
- Burglary in hallway, elevator, stair hall
- Burglary in street or public places
- Burglary on taxi drivers
- Burglary on postal workers
- Burglary on value transports
- Burglary with gas weapons or pepper spray
- Burglary with knife
- Burglary with fire arms
- Burglary with fist beating
- Burglary with beating with blunt object
- Burglary with ripping off of jewels or other objects
- Torture
- Traffic of influence
- Traffic of narcotics

- Traffic of art objects (illegal removal from country)
- Illegal border crossing
- Taking patrimony goods over border
- Involuntary manslaughter
- Injury
- Serious bodily injury
- Rape
- Rape followed by death of victim
- Rape – solicitation of victims in the street
- Rape – solicitation of hitch hiking victims
- Rape – solicitation of victims in elevator
- Rape – breaking into victims' homes
- Violating secret of correspondence
- Other

2.1.63 Field 2.063: Additional Information (INF)

This field contains up to 256 characters of a free text for additional information.

2.1.64 Field 2.064: Respondents List (RLS)

This field contains at least two subfields. The first subfield describes the type of search that has been carried out, using the three-letter mnemonics which specify the transaction type in TOT (Field 1.004).

The second subfield contains a single character. An "I" shall be used to indicate that a HIT has been found and an "N" shall be used to indicate that no matching cases have been found (NOHIT).

The third subfield contains the sequence identifier for the candidate result and the total number of candidates separated by a slash. Multiple messages will be returned if multiple candidates exist. The BKA returns only one transaction as an answer to the requested CPS.

In case of a possible HIT the fourth subfield shall contain the score up to six digits long. If the HIT has been verified the value of this subfield shall be "999999".(BKA Standard)

Example: "CPS{RS}I{RS}001/001{RS}999999{GS}"

In some implementations legal constraints or local guidelines will mandate that the field is restricted to the number of verified respondents only.

If the remote AFR system does not assign scores, then a score of zero should be used at the appropriate point.

2.1.74 Field 2.074: Status/Error Message Field (ERM)

This field contains error messages resulting from transactions, which will be sent back to the requester as part of an Error Transaction.

Format: CCC:Message

Numeric Code (1-3)	Meaning (5-128)
000	TRANSACTION ACCEPTED
001	ERROR: RECORD NOT FOUND
002	ERROR: RECORD ALREADY EXISTS
003	ERROR: UNAUTHORISED ACCESS
101	MANDATORY FIELD MISSING
102	INVALID RECORD TYPE
103	UNDEFINED FIELD
104	EXCEED THE MAXIMUM OCCURRENCE
105	INVALID NUMBER OF SUBFIELDS
106	FIELD LENGTH TOO SHORT
107	FIELD LENGTH TOO LONG
108	FIELD IS NOT A NUMBER AS EXPECTED
109	FIELD NUMBER VALUE TOO SMALL
110	FIELD NUMBER VALUE TOO BIG
111	INVALID CHARACTER
112	INVALID DATE
113	INVALID TIME
114	INVALID DATE OR TIME
115	INVALID ITEM VALUE
116	INVALID TYPE OF TRANSACTION
117	INVALID RECORD DATA
201	ERROR: INVALID TCN
501	ERROR: INSUFFICIENT FINGERPRINT QUALITY
502	ERROR: MISSING FINGERPRINTS
503	ERROR: FINGERPRINT SEQUENCE CHECK FAILED
999	ERROR: ANY OTHER ERROR. FOR FURTHER DETAILS CALL DESTINATION AGENCY.

This field is mandatory for error transactions. If the transaction is used as an delivery acknowledgement this field contains the value

"000:Transaction accepted"

The Acknowledgement message is described in the national Additional Response Information (Field 2.085)

2.1.83 Field 2.083: Finger Present (FPR)

This field shall give information about missing fingerprints. It may consist of one or more subfields containing the Finger Number (FGP, see table 4.2) two digits long and information about the finger:

Descriptor	Code
Amputation	XX
Unable to print (e.g., bandaged)	UP
No information about missing finger	NA

Example: "01{US}XX{RS}08{US}UP{RS}10{US}NA{GS}"

The fields from 2.200 up to 2.300 are defined for Romanian national transactions

The fields 2.200-2.229 contain additional personal information

2.1.200 Field 2.200: Mother's Name (MNM)

This field contains the names of the subject. The format is:

family_name/name/name/ . . .

For instance Charles Peter Bell would appear as "BELL/CHARLES/PETER". If only the family name (surname) is known then this is followed by a single slash. The entire field is limited to 64 characters including the slashes. Spaces, apostrophes, hyphens and full stops that occur within a component name should be entered as such. If the name is longer than 64 characters the 64th character should be a plus sign. The plus sign can only be used in the final position.

2.1.201 Field 2.201: Father's Name (FMN)

This field contains the names of the subject. The format is:

family_name/name/name/ . . .

For instance Charles Peter Bell would appear as "BELL/CHARLES/PETER". If only the family name (surname) is known then this is followed by a single slash. The entire field is limited to 64 characters including the slashes. Spaces, apostrophes, hyphens and full stops that occur within a component name should be entered as such. If the name is longer than 64 characters the 64th character should be a plus sign. The plus sign can only be used in the final position.

2.1.202 Field 2.202: Civil Status (CST)

This field contains a predefined list of the subject's civil status, and is up to 32 characters long.

Possible values are:

- single
- divorced
- separated
- widowed
- married
- living together

2.1.203 Field 2.203: Information Source (ISO)

This field contains a free text description of the information source for the establishment of the persons identity., and is up to 64 characters long.

2.1.204 Field 2.204: National ID (NID)

This field consists of 13-digit number (including leading zeros) representing the national ID of the subject.

2.1.205 Field 2.205: Crimetype (CTY)

This field contains a predefined list of the crime type, and is up to 64 characters long.

Possible values are:

- Family abandonment
- Abuse in service
- Accident and railway catastrophe
- Illegal arrest and abusive criminal investigation
- Association to commit crimes
- Poaching
- Begging
- Venereal disease contamination and AIDS transmission
- Smuggling
- Consignment contract with crimes
- Sexual corruption
- Bribing
- Embezzling
- Desertion
- Destruction
- Copyright
- Escaping
- Tax evasion
- Forging
- False declarations
- Forging under accounting law
- Forging currency and other values
- False identity
- Illegal use of company credit
- Using forged documents with customs authority
- Theft or qualified theft
- Fraudulent administration
- Incest
- Crimes against public traffic regime
- Fraud
- Fraud concerning quality of goods
- Internet fraud
- Gambling
- Illegal detainment
- Beating or injuring causing death
- Accepting bribes
- False testimony

-
- Not submitting health insurance in due time
 - Negligence in service
 - Not respecting regime of firearms and ammunition
 - Homicide
 - Sexual perversions
 - Tomb profanation
 - Prostitution
 - Soliciting/procuring
 - Infanticide
 - Sexual intercourse with a minor
 - Crimes against forest regime
 - Bad treatment of minor
 - Crimes against state security
 - Blackmail
 - Bad treatment
 - Abstraction from levy
 - Burglary
 - Torture
 - Traffic of influence
 - Traffic of narcotics
 - Illegal border crossing
 - Taking patrimony goods over border
 - Involuntary manslaughter
 - Injury
 - Serious bodily injury
 - Rape
 - Violating secret of correspondence
 - Other

The fields 2.230-2.259 contain the person description

2.1.230 Field 2.230: Height (HGT)

This field consists of three-digit number (including leading zeros) representing the height of the subject in centimeter.

2.1.231 Field 2.231: Weight (WGT)

This field consists of three-digit number (including leading zeros) representing the weight of the subject in kilogramm.

2.1.232 Field 2.232: HairColor (HCO)

This field is up to 16 characters long, and contains a free-text description of the color of the subject's hair.

Hair colour
white
blond
grey
black
red
brown

2.1.233 Field 2.233: HairType (HTY)

This field is up to 16 characters long, and contains a free-text description of the style of the subject's hair.

Hair type
bald
curly
straight
wavy
shaved

2.1.234 Field 2.234: EyeColor (ECO)

This field is up to 16 characters long, and contains a free-text description of the color of the subject's eyes.

Eye colour

brown
blue
black
green

2.1.235 Field 2.235: Race (RAC)

This field is up to 32 characters long, and contains a free-text description of the subject's race. instance, for a person 5ft 8in (173 cm) tall this field would be either "F508" or "M173".

Race
African
Arab
Asian
Caucasian
Minorities

2.1.236 Field 2.236: Build (BLD)

This field is up to 32 characters long, and contains a free-text description of the subject's build.

Build
athletic
chubby
fat
obese
thin

2.1.237 Field 2.237: FacialHair (HAI)

This field is up to 16 characters long, and contains a free-text description of the color and style of the subject's facial hair.

Facial Hair
BARBISON
CIOC
CONTUR
FARA
FUMANCHU
GHIDON
MARE
MARE CU COLTURI COBORATE
MARE CU COLTURI DREPTE

MARE CU COLTURI RIDICATE
MEDIE
STUFOASA
SUBTIRE
TAIATA MARUNT PE BUZA
TAIATA PE PORTIUNEA FOSELOR NAZALE

2.1.238 Field 2.238: Eye conditions (ECO)

This field is up to 256 characters long, and contains a free-text description of eye

Eye Conditions
CATARACTA
GLAUCOM
ORB
SASIU
CEACÂR

The fields 2.260-2.279 contain case & process information

2.1.261 Field 2.261: Process Type (PTY)

001:Eurodac_CAT1
 002:Eurodac_CAT2
 003:Eurodac_CAT3
 004:Police_search
 005:Urgent_search
 006:PoliceSearch&EurodacCAT2
 007: PoliceSearch&EurodacCAT3

This field is up to 16 characters long, and contains a unique process ID and a free-text description of the process type in the following format:

XXX:TTTTTTT

e.g.

001:Eurodac_CAT1
 002:Eurodac_CAT2
 003:Eurodac_CAT3
 010:Criminal_Search
 011:Urgend_Search
 030:CriminalSearch&EurodacCAT2
 031:CriminalSearch&EurodacCAT3
 100:LatentSearch

2.1.262 *Field 2.262: Name of Officer (NOO)*

This field specifies the name of the officer taking the fingerprints. The format of this field is identical to NAM (Field 2.030), and is limited to 64 characters including the slashes.

2.1.263 *Field 2.263: Phone Number of Officer (PNO)*

This field contains the officer's phone number up to 16 digits long. Within that number the area code, the local and the extension should be entered.

The fields 2.300-2.99 contain the Eurodac information. These Fields are mandatory if a Eurodac process type (PTY) was selected.

2.1.301 *Field 2.301: Place of the application/apprehension (PAA)*

This field is up to 64 characters long and contains the name of the County Police Inspectorate where the arrest was made.

This field also contains the detailed location information where application is submitted. Valid characters are A-Z, 0-9 (ICAO standard) and for better legibility the special characters slash, hyphen, dot, blank inside. "Blank inside" means that the PAA mustn't start with a special character and consist of special characters only.

2.1.302 *Field 2.302: Date of the application/apprehension (DAA)*

This field states the date of apprehension in ISO format:

YYYYMMDD

where YYYY is the year, MM the month and DD the day.

2.1.303 *Field 2.303: Date of transmission of the transaction (DSF)*

This field is entered as an eight-digit number in the format **CCYYMMDD**.

2.1.304 *Field 2.304: Time of transmission to the transaction (TSF)*

This field is entered as six-digit number in the format of **HHMMSS**.

These two fields should be generated automatically by extracting the date and time from the system.

4 Type-4 Logical Record: High Resolution Gray-Scale Image

It should be noted that Type-4 records are binary rather than ASCII in nature. Therefore each field is assigned a specific position within the record, which implies that all fields are mandatory.

The standard allows both image size and resolution to be specified within the record. It requires Type-4 Logical Records to contain fingerprint image data that are being transmitted at a nominal pixel density of 500 to 520 pixels per inch. The preferred rate for new designs is at a pixel density of 500 pixels per inch or 19.68 pixels per mm. 500 pixels per inch is the density specified by the INT-I, except that similar systems may communicate with each other at a non-preferred rate, within the limits of 500 to 520 pixels per inch.

For a system to comply with the INT-I it is necessary (although not sufficient) that it can send and receive fingerprints as Type-4 records.

4.1 Fields for Type-4 Logical Record

4.1.1 Field 4.001: Logical Record Length (LEN)

This four-byte field contains the length of this Type-4 record, and specifies the total number of bytes including every byte of every field contained in the record.

4.1.2 Field 4.002: Image Designation Character (IDC)

This is the one-byte binary representation of the IDC number given in the header file.

4.1.3 Field 4.003: Impression Type (IMP)

The impression type is a single-byte field occupying the sixth byte of the record.

Table 4.1 - Finger Impression Type

Code	Description
0	Live-scan of plain fingerprint
1	Live-scan of rolled fingerprint
2	Non-live scan impression of plain fingerprint captured from paper
3	Non-live scan impression of rolled fingerprint captured from paper
4	Latent impression captured directly
5	Latent tracing
6	Latent photo
7	Latent lift
8	Swipe
9	Unknown

4.1.4 **Field 4.004: Finger Position (FGP)**

This fixed-length field of 6 bytes occupies the seventh through twelfth byte positions of a Type-4 record. It contains possible finger positions beginning in the left most byte (byte 7 of the record). The known or most probable finger position is taken from the following table. Up to five additional fingers may be referenced by entering the alternate finger positions in the remaining five bytes using the same format. If fewer than five finger position references are to be used the unused bytes are filled with binary 255. To reference all finger positions code 0, for unknown, is used.

Table 4.2 - Finger position code and maximum size

Finger position	Finger code	Width (mm)	Length (mm)
Unknown	0	40.0	40.0
Right thumb	1	45.0	40.0
Right index finger	2	40.0	40.0
Right middle finger	3	40.0	40.0
Right ring finger	4	40.0	40.0
Right little finger	5	33.0	40.0
Left thumb	6	45.0	40.0
Left index finger	7	40.0	40.0
Left middle finger	8	40.0	40.0
Left ring finger	9	40.0	40.0
Left little finger	10	33.0	40.0
Plain right thumb	11	30.0	55.0
Plain left thumb	12	30.0	55.0
Plain right four fingers	13	70.0	65.0
Plain left four fingers	14	70.0	65.0

For scene of crime latents only the codes 0 to 10 should be used.

4.1.5 **Field 4.005: Image Scanning Resolution (ISR)**

This one-byte field occupies the 13th byte of a Type-4 record. If it contains “0” then the image has been sampled at the preferred scanning rate of 19.68 pixels/mm (500 pixels per inch). If it contains “1” then the image has been sampled at an alternative scanning rate as specified in the Type-1 record.

4.1.6 **Field 4.006: Horizontal Line Length (HLL)**

This field is positioned at bytes 14 and 15 within the Type-4 record. It specifies the number of pixels contained in each scan line. The first byte will be the most significant.

4.1.7 Field 4.007: Vertical Line Length (VLL)

This field records in bytes 16 and 17 the number of scan lines present in the image. The first byte is the most significant.

4.1.8 Field 4.008: Gray-scale Compression Algorithm (GCA)

This one-byte field specifies the gray-scale compression algorithm used to encode the image data. A binary zero indicates that no compression algorithm has been used. In this case pixels are recorded in left to right, top to bottom fashion. The FBI will maintain a registry relating non-zero numbers to compression algorithms. The INT-I will use the same allocation of numbers.

4.1.9 Field 4.009: The Image

This field contains a byte stream representing the image. Its structure will obviously depend on the compression algorithm used.

8 Type-8 Logical Record: Signature Image

The Type-8 record is used to transmit a signature in the record. This signature may be either of the officer taking the fingerprints or of the fingerprinted subject. The signature is represented in uncompressed binary, compressed binary or vectorized format. Like the other records containing image information the structure is binary, which implies that record fields take a fixed position and all fields are mandatory.

The following explains the meaning of the individual fields.

8.1 Fields for Type-8 Logical Record

8.1.1 Field 8.001: Logical Record Length (LEN)

The first four bytes of the Type-8 record contain the length of the record expressed as the total number of bytes, including every byte of all eight fields of the record.

8.1.2 Field 8.002: Image Designation Character (IDC)

The fifth byte of the record contains a binary representation of the IDC recorded in CNT (Field 1.003).

8.1.3 Field 8.003: Signature Type (SIG)

The sixth byte contains the signature type field. The permissible values of this field are:

- 0 The signature is that of the fingerprinted subject
- 1 The signature is that of the fingerprinting officer.

8.1.4 Field 8.004: Signature Representation Type (SRT)

This field indicates how the signature is stored, and is located at the seventh byte of the record. The permissible values of this field are:

- 0 The image is uncompressed
- 1 The image is compressed
- 2 The image is vector data.

8.1.5 Field 8.005: Image Scanning Resolution (ISR)

This field gives the image scanning resolution in pixels per mm. One byte is required, in the eighth position of the Type-8 record.

The format is a binary zero if the minimum scanning resolution is used and a one if the native scanning resolution is used. A zero shall also be recorded if the image is in vector format.

8.1.6 Field 8.006: Horizontal Line Length (HLL)

This field occupies the ninth and 10th byte of the Type-8 record. For binary images it specifies the number of pixels per scan line in the image. For vectorized signature data both bytes contain the value "0000 0000". The first byte is the most significant.

8.1.7 Field 8.007: Vertical Line Length (VLL)

This two-byte field indicates the number of scan lines present in a binary image and is positioned at bytes 11 and 12 within the record. As with HLL (Field 8.006) it contains zeros if the signature is in vector representation. The first byte is the most significant.

8.1.8 Field 8.008: Signature Data

This field contains the image data in uncompressed binary, compressed binary or vectorized form according to the entry in SRT (Field 8.004). Binary images are compressed according to the ANSI/EIA-538-1988 facsimile compression algorithm (FAX Group 4 standard).

Vectorized image data specify a list of vectors describing the pen position and pen pressure of line segments within the signature. Each vector is five bytes in length and contains the unsigned binary X position (two bytes, most significant first), the unsigned binary Y position (two bytes, most significant first) and the pen pressure (1 byte). A pressure value of "0000 0000" indicates the end of a line (i.e. pen up), while "0000 0001" to "1111 1110" indicate a range of pressures from the least recordable up to the maximum recordable pressure for the input device. The end of the vector list is indicated by a value of "1111 1111".

The origin of the image is the bottom left hand corner and X,Y positions are expressed units of 0.01mm.

10 Type-10 Logical Record: Facial and/or SMT Binary Image Record

Type-10 records shall contain facial and/or SMT binary image data and related ASCII information pertaining to the specific image contained in this record. It shall be used to exchange both grayscale and color image data. Image data contained in the Type-10 record may be uncompressed or compressed.

10.1 Fields for Type-10 logical record

When there are one or more Type-10 logical records, entries shall be provided in ordered numbered fields. For each field of the Type-10 record, Table 10.1 summarizes the condition code as being mandatory (M) or optional (O), the field number, the field name, character type, size and occurrence limits, and the maximum size in bytes of the field. 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. Fields containing entries in the IMG column are only applicable to that image type. An entry of "FAC" applies to a mugshot or facial image, and an entry of "SMT" applies to scar, a mark, or a tattoo image. The following paragraphs describe the data contained in each of the fields for the Type-10 logical record. Each field shall begin with a seven character ASCII identifier of the form "10.xxx:". The first two characters are the record type followed by a period. The next three characters are the appropriate field number followed by a colon. Descriptive ASCII information or the binary image data follows the seven character identifier.

10.1.1 Field 10.001: Logical Record Length (LEN)

This mandatory ASCII field shall contain the total count of the number of bytes in the Type-10 logical record. Field 10.001 shall specify the length of the record including every character of every field contained in the record and the information separators. The "GS" character shall separate the length code of Field 10.001 from the next field.

10.1.2 Field 10.002: Image Designation Character (IDC)

This mandatory one to four byte ASCII field shall be used to identify the facial or SMT image data contained in the record. This IDC shall match the IDC found in the file content (CNT) field of the Type-1 record.

Table 10.1 - Type-10 facial and SMT record layout

Ident	Cond. code	Field Number	Field Name	IMG	Char type	Field size per occurrence		Occur count		Max byte count
						min.	max.	min	max	
LEN	M	10.001	LOGICAL RECORD LENGTH		N	4	8	1	1	15
IDC	M	10.002	IMAGE DESIGNATION CHARACTER		N	2	5	1	1	12
IMT	M	10.003	IMAGE TYPE		A	5	7	1	1	14

Ident	Cond. code	Field Number	Field Name	IMG	Char type	Field size per occurrence		Occur count		Max byte count
						min.	max.	min	max	
SRC	M	10.004	SOURCE AGENCY / ORI		AN	6	35	1	1	42
PHD	M	10.005	PHOTO DATE		N	9	9	1	1	16
HLL	M	10.006	HORIZONTAL LINE LENGTH		N	4	5	1	1	12
VLL	M	10.007	VERTICAL LINE LENGTH		N	4	5	1	1	12
SLC	M	10.008	SCALE UNITS		N	2	2	1	1	9
HPS	M	10.009	HORIZONTAL PIXEL SCALE		N	3	5	1	1	12
VPS	M	10.010	VERTICAL PIXEL SCALE		N	3	5	1	1	12
CGA	M	10.011	COMPRESSION ALGORITHM		A	5	7	1	1	14
CSP	M	10.012	COLOR SPACE		A	4	5	1	1	12
RSV	-	10.013 10.019	RESERVED FOR FUTURE INCLUSION		--	--	--	--	--	--
POS	O	10.020	SUBJECT POSE	FAC	A	2	2	0	1	9
POA	O	10.021	POSE OFFSET ANGLE	FAC	N	2	5	0	1	12
PXS	O	10.022	PHOTO DESCRIPTION	FAC	A	4	21	0	9	196
RSV	-	10.023 10.039	RESERVED FOR FUTURE INCLUSION		--	--	--	--	--	--
SMT	M	10.040	NCIC DESIGNATION CODE	SMT	A	4	11	1	3	40
SMS	O	10.041	SCAR/MARK/TATTOO SIZE	SMT	N	4	6	0	1	13
SMD	O	10.042	SMT DESCRIPTORS	SMT	AN	16	51	0	9	466
COL	O	10.043	COLORS PRESENT	SMT	A	4	21	0	9	196
RSV	-	10.044 10.199	RESERVED FOR FUTURE INCLUSION		--	--	--	--	--	--
UDF	O	10.200 10.998	USER DEFINED FIELDS		--	--	--	--	--	--
DAT	M	10.999	IMAGE DATA		B	2	5,000,001	1	1	5,000,008

Key for condition code: M = Mandatory; O = Optional

Key for character type: N = Numeric; A = Alphabetic; AN = Alphanumeric; B = Binary

10.1.3 Field 10.003: Image Type (IMT)

This mandatory ASCII field is used to indicate the type of image contained in this record. It shall contain "FACE", "SCAR", "MARK", or "TATTOO" to indicate a face, scar, mark or tattoo image.

10.1.4 Field 10.004: Source Agency / ORI (SRC)

This mandatory ASCII field shall contain the identification of the administration or organization that originally captured the facial image contained in the record. Normally, the Originating Agency Identifier (ORI) of the agency that captured the image will be contained in this field. It consists of two information items in the following format

CC/agency.

The first information item contains the Interpol Country Code, two alpha-numeric characters long. The second item, *agency*, is a free text identification of the agency, up to a maximum of 32 alpha-numeric characters.

10.1.5 Field 10.005: Photo Date (PHD)

This mandatory ASCII field shall contain the date that the facial or SMT image contained in the record was captured. must conform to the ISO standard notation of

YYYYMMDD

where YYYY is the year, MM is the month and DD is the day of the month. Leading zeros are used for single figure numbers. For example, "19931004" represents the 4 October 1993. The complete date must be a legitimate date.

10.1.6 Field 10.006: Horizontal Line Length (HLL)

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

10.1.7 Field 10.007: Vertical Line Length (VLL)

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

10.1.8 Field 10.008: Scale Units (SLC)

This mandatory ASCII 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.

10.1.9 Field 10.009: Horizontal Pixel Scale (HPS)

This mandatory ASCII field shall specify the 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.

10.1.10 Field 10.010: Vertical Pixel Scale (VPS)

This mandatory ASCII field shall specify the 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.

10.1.11 Field 10.011: Compression Algorithm (CGA)

This mandatory ASCII field shall specify the algorithm used to compress the color or grayscale image. An entry of "NONE" in this field indicates that the data contained in this record is

uncompressed. For those images that are to be compressed, the preferred method for the compression of facial and SMT images is specified by the baseline mode of the JPEG algorithm. The data shall be formatted in accordance with the JPEG File Interchange Format, Version 1.02 (JFIF). An entry of "JPEGB" indicates that the scanned or captured image was compressed using baseline JPEG. An entry of "JPEGL" indicates that the lossless mode of the JPEG algorithm was used to compress the image. If the image is captured in grayscale, then only the luminescence component will be compressed and transmitted.

10.1.12 Field 10.012: Colorspace (CSP)

This mandatory ASCII field shall contain the color space used to exchange the image. For compressed images, the preferred colorspace using baseline JPEG and JFIF is YCbCr to be coded as "YCC". An entry of "GRAY" shall be used for all grayscale images. This field shall contain "RGB" for uncompressed color images containing non-interleaved red, green, and blue pixels in that order. All other colorspaces are undefined.

10.1.13 Field 10.013-019: 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.

10.1.14 Field 10.020: Subject Pose (POS)

This optional field is to be used for the exchange of facial image data. When included, this field shall contain a one ASCII character code selected from Table 10.2 to describe the pose of the subject. For the angled pose entry "A", field 10.021 shall contain the offset angle from the full face orientation.

Table 10.2 - Subject pose

Pose description	Pose code
Full Face Frontal	F
Right Profile (90 degree)	R
Left Profile (90 degree)	L
Angled Pose	A

10.1.15 Field 10.021: Pose Offset Angle (POA)

This field shall only be used for the exchange of facial image data if Field 10.020 (POS) contains an "A" to indicate an angled pose of the subject. This field should be omitted for a full face or a profile. This ASCII field specifies the pose position of the subject at any possible orientation within a circle. Its value shall be to a nearest degree.

The offset angle shall be measured from the full-face pose position and have a range of values from -180 degrees to +180 degrees. A positive angle is used to express the angular offset as the subject rotates from a full-face pose to their right (approaching a left profile). A negative angle is

used to express the angular offset as the subject rotates from a full-face pose to their left (approaching a right profile). If the entry in the POS field is an "F", "L", or "R", the contents of this field are ignored.

10.1.16 Field 10.022: Photo Description (PXS)

This optional ASCII field shall be used for the exchange of facial image data. When present, it shall describe special attributes of the captured facial image. Attributes associated with the facial image may be selected from Table 10.3 and entered in this field.

Table 10.3 - Photo descriptors

Facial image attribute	Attribute code
Subject Wearing Glasses	GLASSES
Subject Wearing Hat	HAT
Subject Wearing Scarf	SCARF
Physical Characteristics	PHYSICAL
Other Characteristics	OTHER

Physical characteristics, such as "*FRECKLES*" may be entered as a subfield consisting of two information items. The first is "*PHYSICAL*" followed by the "*US*" separator, followed by the characteristic as listed in Part 4 Section 13 of the Eighth (or current) Edition of the NCIC Code Manual, July 14, 1999 (see table 10.4a). The "*OTHER*" category is used to enter unlisted or miscellaneous attributes of the facial image. This information shall be entered as a two information item subfield. The first is "*OTHER*" followed by the "*US*" separator, followed by the unformatted text used to describe the attribute. Multiple attributes and subfields may be listed but must be separated by the "*RS*" character.

10.1.17 Field 10.023-.039: 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.

10.1.18 Field 10.040: NCIC Designation Code (SMT)

This field is mandatory for a Type-10 record containing SMT image data. It is used to identify a general location of the captured scar, mark, or tattoo image. The contents of this field will be an entry chosen from Part 4 Section 13 of the Eighth (or current) Edition of the NCIC Code Manual, July 14, 1999 (see table 10.4b - 10.4e). The captured image can encompass an area larger than that specified by a single NCIC body part code for the particular image type. This situation can be accommodated by listing multiple NCIC codes separated by the "*RS*" separator character. In this case the primary code is listed first.

For the "marks" category, the NCIC manual lists the common locations for needle track marks. The body location codes listed for scars shall be used for other body part locations or other types of marks not listed in the NCIC Code Manual.

Table 10.4a - Other Physical Characteristics

Item/Location	Code
Bald/Balding	BALD
Cleft chin	CLEFT CHIN
Dimple, Chin	DIMP CHIN
Dimples, left cheek (face)	DIMP L CHK
Dimples, right cheek (face)	DIMP R CHK
Freckles	FRECKLES
Hair implants	HAIR IMPL
Pierced abdomen	PRCD ABDMN
Pierced back	PRCD BACK
Pierced ear, one, nonspecific	PRCD EAR
Pierced ears	PRCD EARS
Pierced left ear	PRCD L EAR
Pierced right ear	PRCD R EAR
Pierced Eyebrow, nonspecific	PRCD EYE
Pierced Left Eyebrow	PRCD L EYE
Pierced Right Eyebrow	PRCD R EYE
Pierced genitalia	PRCD GNTLS
Pierced lip, nonspecific	PRCD LIP
Pierced lip, upper	PRCD ULIP
Pierced lip, lower	PRCD LLIP
Pierced nipple, nonspecific	PRCD NIPPL
Pierced nipple, left	PRCD L NIP
Pierced nipple, right	PRCD R NIP
Pierced nose	PRCD NOSE
Pierced Tongue	PRCD TONGU
Stutters	STUTTERS
Transsexual (Miscellaneous Field should indicate what the individual was at birth and what they are at the time the record is entered in NCIC. [Example: Born male - had surgery and is now female.])	TRANSSXL
Transvestite	TRANSVST

Table 10.4b - Scars (SC)

Item/Location	Code	Item/Location	Code
Abdomen	SC ABDOM	Foot, nonspecific	SC FOOT
Ankle, nonspecific	SC ANKL	Foot, left	SC L FT
Ankle, left	SC L ANKL	Foot, right	SC R FT
Ankle, right	SC R ANKL	Forearm, nonspecific	SC F ARM
Arm, nonspecific	SC ARM	Forearm, left	SC LF ARM
Arm, left	SC L ARM	Forearm, right	SC RF ARM
Arm, right (Use the MIS Field to further describe location)	SC R ARM	Forehead	SC FHD
Arm, left upper	SC UL ARM	Groin area	SC GROIN
Arm, right upper	SC UR ARM	Hand, nonspecific	SC HAND
Back	SC BACK	Hand, left	SC L HND
Breast, nonspecific	SC BREAST	Hand, right	SC R HND

Item/Location	Code	Item/Location	Code
Breast, left	SC L BRST	Head, nonspecific (Use the MIS Field to further describe location)	SC HEAD
Breast, right	SC R BRST	Hip, nonspecific	SC HIP
Buttock, nonspecific	SC BUTTK	Hip, left	SC L HIP
Buttock, left	SC L BUTTK	Hip, right	SC R HIP
Buttock, right	SC R BUTTK	Knee, nonspecific	SC KNEE
Calf, nonspecific	SC CALF	Knee, left	SC L KNEE
Calf, left	SC L CALF	Knee, right	SC R KNEE
Calf, right	SC R CALF	Leg, nonspecific	SC LEG
Cheek (face), nonspecific	SC CHK	Leg, left, nonspecific	SC L LEG
Cheek (face), left	SC L CHK	Leg, right, nonspecific (Use the MIS Field to further describe location)	SC R LEG
Cheek (face), right	SC R CHK	Lip, nonspecific	SC LIP
Chest	SC CHEST	Lip, lower	SC LOW LIP
Chin	SC CHIN	Lip, upper	SC UP LIP
Ear, nonspecific	SC EAR	Neck	SC NECK
Ear, left	SC L EAR	Nose	SC NOSE
Ear, right	SC R EAR	Penis	SC PENIS
Elbow, nonspecific	SC ELBOW	Pockmarks	POCKMARKS
Elbow, left	SC L ELB	Shoulder, nonspecific	SC SHLD
Elbow, right	SC R ELB	Shoulder, left	SC L SHLD
Eyebrow, nonspecific	SC EYE	Shoulder, right	SC R SHLD
Eyebrow, left/left eye area	SC L EYE	Thigh, nonspecific	SC THGH
Eyebrow, right/right eye area	SC R EYE	Thigh, left	SC L THGH
Face, nonspecific (Use the MIS Field to further describe location)	SC FACE	Thigh, right	SC R THGH
Finger, nonspecific	SC FGR	Wrist, nonspecific	SC WRIST
Finger(s), left hand	SC L FGR	Wrist, left	SC L WRIST
Finger(s), right hand	SC R FGR	Wrist, right	SC R WRIST

Table 10.4c - Needle ("Track") Marks (NM)

Item/Location	Code	Item/Location	Code
Arm, left	NM L ARM	Hand, left	NM L HND
Arm, right	NM R ARM	Hand, right	NM R HND
Buttock, left	NM L BUTTK	Leg, left	NM L LEG
Buttock, right	NM R BUTTK	Leg, right	NM R LEG
Finger(s), left hand	NM L FGR	Thigh, left	NM L THIGH
Finger(s), right hand	NM R FGR	Thigh, right	NM R THIGH
Foot, left	NM L FOOT	Wrist, left	NM L WRIST
Foot, right	NM R FOOT	Wrist, right	NM R WRIST

Table 10.4d - Tattoos (TAT)

Item/Location	Code	Item/Location	Code
Abdomen	TAT ABDOM	Forearm, nonspecific	TAT FARM
Ankle, nonspecific	TAT ANKL	Forearm, left	TAT LF ARM

Item/Location	Code	Item/Location	Code
Ankle, left	TAT L ANKL	Forearm, right	TAT RF ARM
Ankle, right	TAT R ANKL	Forehead	TAT FHD
Arm, nonspecific	TAT ARM	Full Body (Use only when the entire body - arms, legs, chest, and back are covered with tattoos.)	TAT FLBODY
Arm, left	TAT L ARM	Groin Area	TAT GROIN
Arm, right (Use the MIS Field to further describe location)	TAT R ARM	Hand, nonspecific	TAT HAND
Arm, left upper	TAT UL ARM	Hand, left	TAT L HND
Arm, right upper	TAT UR ARM	Hand, right	TAT R HND
Back	TAT BACK	Head, nonspecific (Use the MIS Field to further describe location)	TAT HEAD
Breast, nonspecific	TAT BREAST	Hip, nonspecific	TAT HIP
Breast, left	TAT L BRST	Hip, left	TAT L HIP
Breast, right	TAT R BRST	Hip, right	TAT R HIP
Buttocks, nonspecific	TAT BUTTK	Knee, nonspecific	TAT KNEE
Buttock, left	TAT L BUTK	Knee, left	TAT L KNEE
Buttock, right	TAT R BUTK	Knee, right	TAT R KNEE
Calf, nonspecific	TAT CALF	Leg, nonspecific	TAT LEG
Calf, left	TAT L CALF	Leg, left	TAT L LEG
Calf, right	TAT R CALF	Leg, right (Use the MIS Field to further describe location)	TAT R LEG
Cheek (face), nonspecific	TAT CHEEK	Lip, nonspecific	TAT LIP
Cheek (face), left	TAT L CHK	Lip, lower	TAT LW LIP
Cheek (face), right	TAT R CHK	Lip, upper	TAT UP LIP
Chest	TAT CHEST	Neck	TAT NECK
Chin	TAT CHIN	Nose	TAT NOSE
Ear, nonspecific	TAT EAR	Penis	TAT PENIS
Ear, left	TAT L EAR	Shoulder, nonspecific	TAT SHLD
Ear, right	TAT R EAR	Shoulder, left	TAT L SHLD
Elbow, nonspecific	TAT ELBOW	Shoulder, right	TAT R SHLD
Elbow, left	TAT LELBOW	Thigh, nonspecific	TAT THGH
Elbow, right	TAT RELBOW	Thigh, left	TAT L THGH
Face, nonspecific (Use the MIS Field to further describe location)	TAT FACE	Thigh, right	TAT R THGH
Finger, nonspecific	TAT FNGR	Wrist, nonspecific	TAT WRS
Finger(s), left hand	TAT L FGR	Wrist, left	TAT L WRS
Finger(s), right hand	TAT R FGR	Wrist, right	TAT R WRS
Foot, nonspecific	TAT FOOT		
Foot, left	TAT L FOOT		
Foot, right	TAT R FOOT		

Table 10.4e - Removed Tattoos (RTAT)

Item/Location	Code	Item/Location	Code
Abdomen	RTAT ABDM	Forearm, nonspecific	RTAT FARM
Ankle, nonspecific	RTAT ANKL	Forearm, left	RTAT LFARM
Ankle, left	RTAT LANKL	Forearm, right	RTAT RFARM
Ankle, right	RTAT RANKL	Forehead	RTAT FHD

Item/Location	Code	Item/Location	Code
Arm, nonspecific	RTAT ARM	Full Body (Use only when the entire body - arms, legs, chest, and back are covered with tattoos.)	RTAT FLBOD
Arm, left	RTAT L ARM	Groin Area	RTAT GROIN
Arm, right (Use the MIS Field to further describe location)	RTAT R ARM	Hand, nonspecific	RTAT HAND
Arm, left upper	RTAT ULARM	Hand, left	RTAT L HND
Arm, right upper	RTAT URARM	Hand, right	RTAT R HND
Back	RTAT BACK	Head, nonspecific (Use the MIS Field to further describe location)	RTAT HEAD
Breast, nonspecific	RTAT BRST	Hip, nonspecific	RTAT HIP
Breast, left	RTAT LBRST	Hip, left	RTAT L HIP
Breast, right	RTAT RBRST	Hip, right	RTAT R HIP
Buttocks, nonspecific	RTAT BUTTK	Knee, nonspecific	RTAT KNEE
Buttock, left	RTAT LBUTK	Knee, left	RTAT LKNEE
Buttock, right	RTAT RBUTK	Knee, right	RTAT RKNEE
Calf, nonspecific	RTAT CALF	Leg, nonspecific	RTAT LEG
Calf, left	RTAT LCALF	Leg, left	RTAT L LEG
Calf, right	RTAT RCALF	Leg, right (Use the MIS Field to further describe location)	RTAT R LEG
Cheek (face), nonspecific	RTAT CHEEK	Lip, nonspecific	RTAT LIP
Cheek (face), left	RTAT LCHK	Lip, lower	RTAT LWLIP
Cheek (face), right	RTAT RCHK	Lip, upper	RTAT UPLIP
Chest	RTAT CHEST	Neck	RTAT NECK
Chin	RTAT CHIN	Nose	RTAT NOSE
Ear, nonspecific	RTAT EAR	Penis	RTAT PENIS
Ear, left	RTAT L EAR	Shoulder, nonspecific	RTAT SHLD
Ear, right	RTAT R EAR	Shoulder, left	RTAT LSHLD
Elbow, nonspecific	RTAT ELBOW	Shoulder, right	RTAT RSHLD
Elbow, left	RTAT L ELB	Thigh, nonspecific	RTAT THGH
Elbow, right	RTAT R ELB	Thigh, left	RTAT LTHGH
Face, nonspecific (Use the MIS Field to further describe location)	RTAT FACE	Thigh, right	RTAT RTHGH
Finger, nonspecific	RTAT FNGR	Wrist, nonspecific	RTAT WRS
Finger(s), left hand	RTAT L FGR	Wrist, left	RTAT LWRS
Finger(s), right hand	RTAT R FGR	Wrist, right	RTAT RWRS
Foot, nonspecific	RTAT FOOT		
Foot, left	RTAT LFOOT		
Foot, right	RTAT RFOOT		

10.1.19 Field 10.041: SMT Size (SMS)

This optional field shall contain the dimensions of the scar, mark or tattoo. It shall consist of two information items. The height shall be the first information item followed by the "US" separator character followed by the width. Each dimension shall be entered to the nearest centimeter.

10.1.20 Field 10.042: SMT Descriptors (SMD)

This optional field is used to describe the content of the SMT image. It shall consist of one or more subfields. Each subfield shall contain three or four information items that provide progressively detailed information describing the total image or a portion of the image.

The first information item of each subfield shall identify the source of the SMT. It shall contain "SCAR" to indicate healed scar tissue that was the result an accident or medical procedure. An entry of "MARK" shall be used for the pattern resulting from needle or "Track" marks. For either case the second and third information items shall contain "OTHER" and "MISC" and the fourth information item shall contain a textual description or other information concerning the scar or mark pattern.

For deliberately applied or drawn images, the first information item will contain "TATTOO" to indicate a common tattoo or indelible image resulting from the pricking of the skin with a coloring matter; "CHEMICAL" if the image was created by the use of chemicals to burn the image into the skin; "BRANDED" if the image was burned into the skin using a branding iron or other form of heat; or "CUT" if the image was caused by incision of the skin.

The second information item shall be the general class code of tattoo chosen from Table 10.5. For each general class of tattoo, there are several defined subclasses. The third information item of the subfield shall be the appropriate subclass code selected from Tables 10.6a - 10.6h which lists the various subclasses of tattoos for each of the general classes.

The final and optional information item in this subfield shall be an ASCII text string that provides additional qualifiers to describe the image or portion of the image. For example, to fully describe a tattoo, there may be a class description of "ANIMAL", with a subclass description of "DOG", and qualified by "golden retriever with an overbite". The "US" separator character will be used between information items.

An SMT image consisting of several parts or sub-images shall use multiple subfields, separated by the "RS" separator, to fully describe the various parts or features found in the total image. The first subfield shall describe the most predominant feature or sub-image contained in the SMT image. Subsequent subfields shall describe additional portions of the image that are not part of the main or central focal point of the image. For example, a tattoo consisting of a man with a snake on the arm being followed by a dog may contain three subfields - one describing the man, a second describing the snake, and a third describing the dog.

Table 10.5 - Tattoo classes

Class description	Class code
Human Forms and Features	HUMAN
Animals and Animal Features	ANIMAL
Plants	PLANT
Flags	FLAG
Objects	OBJECT
Abstractions	ABSTRACT
Insignias & Symbols	SYMBOL
Other Images	OTHER

Table 10.6a - Human tattoo subclasses

Subclass	Subclass code
Male Face	MFACE
Female Face	FFACE
Abstract Face	ABFACE
Male Body	MBODY
Female Body	FBODY
Abstract Body	ABBODY
Roles (Knight, Witch, man, etc.)	ROLES
Sports Figures (Football Player, Skier, etc.)	SPORT
Male Body Parts	MBPART
Female Body Parts	FBPART
Abstract Body Parts	ABBPART
Skulls	SKULL
Miscellaneous Human Forms	MHUMAN

Table 10.6b - Animal tattoo subclasses

Subclass	Subclass code
Cats & Cat Heads	CAT
Dogs & Dog Heads	DOG
Other Domestic Animals	DOMESTIC
Vicious Animals (Lions, Tigers, Wolves, etc.)	VICIOUS
Horses (Donkeys, Mules, etc.)	HORSE
Other Wild Animals	WILD
Snakes	SNAKE
Dragons	DRAGON
Birds (Cardinal, Hawk, etc.)	BIRD
Spiders, Bugs, and Insects	INSECT
Abstract Animals	ABSTRACT
Animal Parts	PARTS
Miscellaneous Animal Forms	MANIMAL

Table 10.6c - Plant tattoo subclasses

Subclass	Subclass code
Narcotics	NARCOTICS
Red Flowers	REDFL
Blue Flowers	BLUEFL
Yellow Flowers	YELFL
Drawings of Flowers	DRAW
Rose	ROSE
Tulip	TULIP
Lily	LILY
Miscellaneous Plants, Flowers, Vegetables	MPLANT

Table 10.6d - Flags tattoo subclasses

Subclass	Subclass code
American Flag	USA
State Flag	STATE
Nazi Flag	NAZI
Confederate Flag	CONFED
British Flag	BRIT
Miscellaneous Flags	MFLAG

Table 10.6e - Objects tattoo subclasses

Subclass	Subclass code
Fire	FIRE
Weapons (Guns, Arrows, etc.)	WEAP
Airplanes	PLANE
Boats, Ships, and Other Vessels	VESSEL
Trains	TRAIN
Cars, Trucks, and Vehicles	VEHICLE
Mythical (Unicorns, etc.)	MYTH
Sporting Objects (Football, Ski, Hurdles, etc.)	SPORT
Water & Nature Scenes (Rivers, Sky, Trees, etc.)	NATURE
Miscellaneous Objects	MOBJECTS

Table 10.6f - Abstract tattoo subclasses

Subclass	Subclass code
Figure(s)	FIGURE
Sleeve	SLEEVE
Bracelet	BRACE
Anklet	ANKLET
Necklace	NECKLC
Shirt	SHIRT
Body Band	BODBND
Head Band	HEDBND
Miscellaneous Abstract	MABSTRACT

Table 10.6g - Symbols tattoo subclasses

Subclass	Subclass code
National Symbols	NATION
Political Symbols	POLITIC
Military Symbols	MILITARY
Fraternal Symbols	FRATERNAL
Professional Symbols	PROFESS
Gang Symbols	GANG
Miscellaneous Symbols	MSYMBOLS

Table 10.6h - Other tattoo subclasses

Subclass	Subclass code
Wording (Mom, Dad, Mary, etc.)	WORDING
Freeform Drawings	FREEFRM
Miscellaneous Images	MISC

10.1.21 Field 10.043: Color (COL)

This optional field shall contain one subfield corresponding to each subfield contained in Field 10.042. Each subfield shall contain one or more information items that list the color(s) of the tattoo or part of the tattoo. For each subfield, the first information item in the subfield shall be the predominant color chosen from Table 10.7. Additional colors for the sub-field shall be entered as information items in the subfield separated by the "US" separator character.

Table 10.7 - Other tattoo subclasses

Color Description	Color Code
Black	BLACK
Brown	BROWN
Gray	GRAY
Blue	BLUE
Green	GREEN
Orange	ORANGE
Purple	PURPLE
Red	RED
Yellow	YELLOW
White	WHITE
Multi-colored	MULTI
Outlined	OUTLINE

10.1.22 Field 10.044-199: 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.

10.1.23 Field 10.200-998: 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.

10.1.24 Field 10.999: Image Data (DAT)

This field shall contain all of the grayscale or color data from a face, scar, mark, tattoo, or other image. It shall always be assigned field number 999 and must be the last physical field in the record. For example, "10.999:" is followed by image data in a binary representation.

Each pixel of uncompressed grayscale data shall be quantized to eight bits (256 gray levels) contained in a single byte. Uncompressed color image data shall be expressed as 24 bit RGB pixels. The first byte shall contain the eight bits for the red component of the pixel, the second byte shall contain the eight bits for the green component of the pixel, and the third byte shall contain the last eight bits for the blue component of the pixel. If compression is used, the pixel data shall be compressed in accordance with the compression technique specified in the GCA field. If the JPEG algorithm is to be used to compress the data, this field shall be encoded using the JFIF format specification.

10.2 End of Type-10 Logical Record

For the sake of consistency, immediately following the last byte of data from field 10.999 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-10 record.

10.3 Additional Facial & SMT Image Records

Additional Type-10 records may be included in the file. For each additional facial or SMT image, a complete Type-10 logical record together with the "FS" separator is required.

11 Type-13 variable-resolution latent image record

The Type-13 tagged-field logical record shall contain image data acquired from latent images. These images are intended to be transmitted to agencies that will automatically extract or provide human intervention and processing to extract the desired feature information from the images.

Information regarding the scanning resolution used, the image size, and other parameters required to process the image, are recorded as tagged-fields within the record.

Table 11.1 - Type-13 variable-resolution latent 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	13.001	LOGICAL RECORD LENGTH	N	4	8	1	1	15
IDC	M	13.002	IMAGE DESIGNATION CHARACTER	N	2	5	1	1	12
IMP	M	13.003	IMPRESSION TYPE	A	2	2	1	1	9
SRC	M	13.004	SOURCE AGENCY / ORI	AN	6	35	1	1	42
LCD	M	13.005	LATENT CAPTURE DATE	N	9	9	1	1	16
HLL	M	13.006	HORIZONTAL LINE LENGTH	N	4	5	1	1	12
VLL	M	13.007	VERTICAL LINE LENGTH	N	4	5	1	1	12
SLC	M	13.008	SCALE UNITS	N	2	2	1	1	9
HPS	M	13.009	HORIZONTAL PIXEL SCALE	N	2	5	1	1	12
VPS	M	13.010	VERTICAL PIXEL SCALE	N	2	5	1	1	12
CGA	M	13.011	COMPRESSION ALGORITHM	A	5	7	1	1	14
BPX	M	13.012	BITS PER PIXEL	N	2	3	1	1	10
FGP	M	13.013	FINGER POSITION	N	2	3	1	6	25
RSV		13.014 13.019	RESERVED FOR FUTURE DEFINITION	--	--	--	--	--	--
COM	O	13.020	COMMENT	A	2	128	0	1	135
RSV		13.021 13.199	RESERVED FOR FUTURE DEFINITION	--	--	--	--	--	--
UDF	O	13.200 13.998	USER-DEFINED FIELDS	--	--	--	--	--	--
DAT	M	13.999	IMAGE DATA	B	2	--	1	1	--

Key for character type: N = Numeric; A = Alphabetic; AN = Alphanumeric; B = Binary

11.1 Fields for the Type-13 logical record

The following paragraphs describe the data contained in each of the fields for the Type-13 logical record.

Within a Type-13 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 image data shall be the last physical field in the record. For each field of the Type-13 record, Table 11.1 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.

11.1.1 Field 13.001: Logical record length (LEN)

This mandatory ASCII field shall contain the total count of the number of bytes in the Type-13 logical record. Field 13.001 shall specify the length of the record including every character of every field contained in the record and the information separators.

11.1.2 Field 13.002: Image designation character (IDC)

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

11.1.3 Field 13.003: Impression type (IMP)

This mandatory one- or two-byte ASCII field shall indicate the manner by which the latent image information was obtained. The appropriate latent code choice selected from Table 4.1 (finger) or Table 13.2 (palm) shall be entered in this field.

11.1.4 Field 13.004: Source agency / ORI (SRC)

This mandatory ASCII field shall contain the identification of the administration or organization that originally captured the facial image contained in the record. Normally, the Originating Agency Identifier (ORI) of the agency that captured the image will be contained in this field. It consists of two information items in the following format

CC/agency.

The first information item contains the Interpol Country Code, two alpha-numeric characters long. The second item, *agency*, is a free text identification of the agency, up to a maximum of 32 alpha-numeric characters.

11.1.5 Field 13.005: Latent capture date (LCD)

This mandatory ASCII field shall contain the date that the latent image contained in the record was captured. The date shall appear as eight digits in the format CCYYMMDD. The CCYY characters shall represent the year the image was captured; the MM characters shall be the tens and units values of the month; and the DD characters shall be the tens and units values of the day in the month. For example, 20000229 represents February 29, 2000. The complete date must be a legitimate date.

11.1.6 Field 13.006: Horizontal line length (HLL)

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

11.1.7 Field 13.007: Vertical line length (VLL)

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

11.1.8 Field 13.008: Scale units (SLC)

This mandatory ASCII 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.

11.1.9 Field 13.009: Horizontal pixel scale (HPS)

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

11.1.10 Field 13.010: Vertical pixel scale (VPS)

This mandatory ASCII 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.

11.1.11 Field 13.011: Compression algorithm (CGA)

This mandatory ASCII field shall specify the algorithm used to compress grayscale images. An entry of "NONE" in this field indicates that the data contained in this record is uncompressed. For those images that are to be losslessly compressed, this field shall contain the preferred method for the compression of latent fingerprint images. For grayscale images, the domain registrar shall maintain a registry of compression techniques and corresponding codes that may be used as they become available.

11.1.12 Field 13.012: Bits per pixel (BPX)

This mandatory ASCII field shall contain the number of bits used to represent a pixel. This field shall contain an entry of "8" for normal grayscale values of "0" to "255". Any entry in this field greater than "8" shall represent a grayscale pixel with increased precision.

11.1.13 Field 13.013: Finger / palm position (FGP)

This mandatory tagged-field shall contain one or more the possible finger or palm positions that may match the latent image. The decimal code number corresponding to the known or most probable finger position shall be taken from Table 4.2 or the most probable palm position from Table 13.3 and entered as a one- or two-character ASCII subfield. Additional finger and/or palm positions may be referenced by entering the alternate position codes as subfields separated by the "RS" separator character. The code "0", for "Unknown Finger", shall be used to reference every finger position from one through ten. The code "20", for

"Unknown Palm", shall be used to reference every listed palmprint position.

11.1.14 Field 13.014-019: 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.

11.1.15 Field 13.020: Comment (COM)

This optional field may be used to insert comments or other ASCII text information with the latent image data.

11.1.16 Field 13.021-199: 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.

11.1.17 Fields 13.200-998: 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.

11.1.18 Field 13.999: Image data (DAT)

This field shall contain all of data from a captured latent image. It shall always be assigned field number 999 and must be the last physical field in the record. For example, "13.999:" is followed by image data in a binary representation.

Each pixel of uncompressed grayscale data shall normally be quantized to eight bits (256 gray levels) contained in a single byte. If the entry in BPX Field 13.012 is greater or less than "8", the number of bytes required to contain a pixel will be different. If compression is used, the pixel data shall be compressed in accordance with the compression technique specified in the GCA field.

11.2 *End of Type-13 variable-resolution latent image record*

For the sake of consistency, immediately following the last byte of data from field 13.999 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-13 record.

11.3 *Additional variable-resolution latent image records*

Additional Type-13 records may be included in the file. For each additional latent image, a complete Type-13 logical record together with the “FS” separator is required.

12 Type-14 variable-resolution tenprint image record

The Type-14 tagged-field logical record shall contain and be used to exchange tenprint fingerprint image data. Rolled and plain fingerprint impressions shall be acquired from a tenprint card or from a live-scan device. Captured images are intended to be transmitted to agencies that will automatically extract the desired feature information from the images for matching purposes.

Textual information regarding the scanning resolution used, the image size and other parameters or comments required to process the image are recorded as tagged-fields within the record.

12.1 Fields for the Type-14 logical record

The following paragraphs describe the data contained in each of the fields for the Type-14 logical record.

Within a Type-14 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 image data shall be the last physical field in the record. For each field of the Type-14 record, Table 12.1 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 12.1 – Type-14 variable-resolution tenprint 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	14.001	LOGICAL RECORD LENGTH	N	4	8	1	1	15
IDC	M	14.002	IMAGE DESIGNATION CHARACTER	N	2	5	1	1	12
IMP	M	14.003	IMPRESSION TYPE	A	2	2	1	1	9
SRC	M	14.004	SOURCE AGENCY / ORI	AN	6	35	1	1	42
TCD	M	14.005	TENPRINT CAPTURE DATE	N	9	9	1	1	16
HLL	M	14.006	HORIZONTAL LINE LENGTH	N	4	5	1	1	12
VLL	M	14.007	VERTICAL LINE LENGTH	N	4	5	1	1	12
SLC	M	14.008	SCALE UNITS	N	2	2	1	1	9
HPS	M	14.009	HORIZONTAL PIXEL SCALE	N	2	5	1	1	12
VPS	M	14.010	VERTICAL PIXEL SCALE	N	2	5	1	1	12
CGA	M	14.011	COMPRESSION ALGORITHM	A	5	7	1	1	14
BPX	M	14.012	BITS PER PIXEL	N	2	3	1	1	10
FGP	M	14.013	FINGER POSITION	N	2	3	1	6	25
RSV		14.014 14.019	RESERVED FOR FUTURE DEFINITION	--	--	--	--	--	--
COM	O	14.020	COMMENT	A	2	1 28	0	1	128

Ident	Cond. code	Field Number	Field Name	Char type	Field size per occurrence		Occur count		Max byte count
					min.	max.	min	max	
RSV		14.021 14.199	RESERVED FOR FUTURE DEFINITION	--	--	--	--	--	--
UDF	O	14.200 14.998	USER-DEFINED FIELDS	--	--	--	--	--	--
DAT	M	14.999	IMAGE DATA	B	2	--	1	1	--

Key for character type: N = Numeric; A = Alphabetic; AN = Alphanumeric; B = Binary

12.1.1 **Field 14.001: Logical record length (LEN)**

This mandatory ASCII field shall contain the total count of the number of bytes in the Type-14 logical record. Field 14.001 shall specify the length of the record including every character of every field contained in the record and the information separators.

12.1.2 **Field 14.002: Image designation character (IDC)**

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

12.1.3 **Field 14.003: Impression type (IMP)**

This mandatory one-byte ASCII field shall indicate the manner by which the tenprint image information was obtained. The appropriate code selected from Table 4.1 shall be entered in this field.

12.1.4 **Field 14.004: Source agency / ORI (SRC)**

This mandatory ASCII field shall contain the identification of the administration or organization that originally captured the facial image contained in the record. Normally, the Originating Agency Identifier (ORI) of the agency that captured the image will be contained in this field. It consists of two information items in the following format

CC/agency.

The first information item contains the Interpol Country Code, two alpha-numeric characters long. The second item, *agency*, is a free text identification of the agency, up to a maximum of 32 alpha-numeric characters.

12.1.5 **Field 14.005: Tenprint capture date (TCD)**

This mandatory ASCII field shall contain the date that the tenprint image was captured. The date shall appear as eight digits in the format CCYYMMDD. The CCYY characters shall represent the year the image was captured; the MM characters shall be the tens and units values of the

month; and the DD characters shall be the tens and units values of the day in the month. For example, the entry 20000229 represents February 29, 2000. The complete date must be a legitimate date.

12.1.6 Field 14.006: Horizontal line length (HLL)

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

12.1.7 Field 14.007: Vertical line length (VLL)

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

12.1.8 Field 14.008: Scale units (SLC)

This mandatory ASCII 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.

12.1.9 Field 14.009: Horizontal pixel scale (HPS)

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

12.1.10 Field 14.010: Vertical pixel scale (VPS)

This mandatory ASCII 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.

12.1.11 Field 14.011: Compression algorithm (CGA)

This mandatory ASCII field shall specify the algorithm used to compress grayscale images. An entry of "NONE" in this field indicates that the data contained in this record is uncompressed. For those images that are to be compressed, this field shall contain the preferred method for the compression of tenprint fingerprint images. For grayscale images, the domain registrar maintains a registry of acceptable compression techniques and corresponding codes that may be used as they become available.

12.1.12 Field 14.012: Bits per pixel (BPX)

This mandatory ASCII field shall contain the number of bits used to represent a pixel. This field shall contain an entry of “8” for normal grayscale values of “0” to “255”. Any entry in this field greater than or less than “8” shall represent a grayscale pixel with increased or decreased precision respectively.

12.1.13 Field 14.013: Finger position (FGP)

This mandatory tagged-field shall contain finger position that matches the tenprint image. The decimal code number corresponding to the known or most probable finger position shall be taken from Table 4.2 and entered as a one- or two-character ASCII subfield. Table 4.2 also lists the maximum image area that can be transmitted for each of the fourteen possible finger positions. Additional finger positions may be referenced in the transaction by entering the alternate finger positions as subfields separated by the “RS” separator character. The code "0", for "Unknown Finger", shall be used to reference every finger position from one through ten.

12.1.14 Field 14.014-019: 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.

12.1.15 Field 14.020: Comment (COM)

This optional field may be used to insert comments or other ASCII text information with the tenprint image data.

12.1.16 Field 14.021-199: 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.

12.1.17 Fields 14.200-998: 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.

12.1.18 Field 14.999: Image data (DAT)

This field shall contain all of the data from a captured tenprint image. It shall always be assigned field number 999 and must be the last physical field in the record. For example, “14.999:” is followed by image data in a binary representation.

Each pixel of uncompressed grayscale data shall normally be quantized to eight bits (256 gray levels) contained in a single byte. If the entry in BPX Field 14.012 is greater or less than “8”, the number of bytes required to contain a pixel will be different. If compression is used, the pixel data shall be compressed in accordance with the compression technique specified in the CGA field.

12.2 *End of Type-14 variable-resolution tenprint image record*

For the sake of consistency, immediately following the last byte of data from field 14.999 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-14 record.

12.3 *Additional variable-resolution tenprint image records*

Additional Type-14 records may be included in the file. For each additional tenprint image, a complete Type-14 logical record together with the “FS” separator is required.

13 Type-15 variable-resolution palmprint image record

The Type-15 tagged-field logical record shall contain and be used to exchange palmprint image data together with fixed and user-defined textual information fields pertinent to the digitized image. Information regarding the scanning resolution used, the image size and other parameters or comments required to process the image are recorded as tagged-fields within the record. Palmprint images transmitted to other agencies will be processed by the recipient agencies to extract the desired feature information required for matching purposes.

The image data shall be acquired directly from a subject using a live-scan device, or from a palmprint card or other media that contains the subject's palmprints.

Any method used to acquire the palmprint images shall be capable of capturing a set of images for each hand. This set shall include the writer's palm as a single scanned image, and the entire area of the full palm extending from the wrist bracelet to the tips of the fingers as one or two scanned images. If two images are used to represent the full palm, the lower image shall extend from the wrist bracelet to the top of the interdigital area (third finger joint) and shall include the thenar, and hypothenar areas of the palm. The upper image shall extend from the bottom of the interdigital area to the upper tips of the fingers. This provides an adequate amount of overlap between the two images that are both located over the interdigital area of the palm. By matching the ridge structure and details contained in this common area, an examiner can confidently state that both images came from the same palm.

As a palmprint transaction may be used for different purposes, it may contain one or more unique image areas recorded from the palm or hand. A complete palmprint record set for one individual will normally include the writer's palm and the full palm image(s) from each hand. Since a tagged-field logical image record may contain only one binary field, a single Type-15 record will be required for each writer's palm and one or two Type-15 records for each full palm. Therefore, four to six Type-15 records will be required to represent the subject's palmprints in a normal palmprint transaction.

13.1 *Fields for the Type-15 logical record*

The following paragraphs describe the data contained in each of the fields for the Type-15 logical record.

Within a Type-15 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 image data shall be the last physical field in the record. For each field of the Type-15 record, Table 13.1 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.

13.1.1 Field 15.001: Logical record length (LEN)

This mandatory ASCII field shall contain the total count of the number of bytes in the Type-15 logical record. Field 15.001 shall specify the length of the record including every character of every field contained in the record and the information separators.

13.1.2 Field 15.002: Image designation character (IDC)

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

13.1.3 Field 15.003: Impression type (IMP)

This mandatory one-byte ASCII field shall indicate the manner by which the palmprint image information was obtained. The appropriate code selected from Table 13.2 shall be entered in this field.

13.1.4 Field 15.004: Source agency/ORI (SRC)

This mandatory ASCII field shall contain the identification of the administration or organization that originally captured the facial image contained in the record. Normally, the Originating Agency Identifier (ORI) of the agency that captured the image will be contained in this field. It consists of two information items in the following format

CC/agency.

The first information item contains the Interpol Country Code, two alpha-numeric characters long. The second item, *agency*, is a free text identification of the agency, up to a maximum of 32 alpha-numeric characters.

13.1.5 Field 15.005: Palmprint capture date (PCD)

This mandatory ASCII field shall contain the date that the palmprint image was captured. The date shall appear as eight digits in the format CCYYMMDD. The CCYY characters shall represent the year the image was captured; the MM characters shall be the tens and units values of the month; and the DD characters shall be the tens and units values of the day in the month. For example, the entry 20000229 represents February 29, 2000. The complete date must be a legitimate date.

13.1.6 Field 15.006: Horizontal line length (HLL)

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

13.1.7 Field 15.007: Vertical line length (VLL)

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

13.1.8 Field 15.008: Scale units (SLC)

This mandatory ASCII 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.

13.1.9 Field 15.009: Horizontal pixel scale (HPS)

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

13.1.10 Field 15.010: Vertical pixel scale (VPS)

This mandatory ASCII 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.

Table 13.1 – Type-15 variable-resolution palmprint 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	15.001	LOGICAL RECORD LENGTH	N	4	8	1	1	15
IDC	M	15.002	IMAGE DESIGNATION CHARACTER	N	2	5	1	1	12
IMP	M	15.003	IMPRESSION TYPE	N	2	2	1	1	9
SRC	M	15.004	SOURCE AGENCY / ORI	AN	6	35	1	1	42
PCD	M	15.005	PALMPRINT CAPTURE DATE	N	9	9	1	1	16
HLL	M	15.006	HORIZONTAL LINE LENGTH	N	4	5	1	1	12
VLL	M	15.007	VERTICAL LINE LENGTH	N	4	5	1	1	12
SLC	M	15.008	SCALE UNITS	N	2	2	1	1	9
HPS	M	15.009	HORIZONTAL PIXEL SCALE	N	2	5	1	1	12
VPS	M	15.010	VERTICAL PIXEL SCALE	N	2	5	1	1	12
CGA	M	15.011	COMPRESSION ALGORITHM	AN	5	7	1	1	14
BPX	M	15.012	BITS PER PIXEL	N	2	3	1	1	10
PLP	M	15.013	PALMPRINT POSITION	N	2	3	1	1	10
RSV		15.014 15.019	RESERVED FOR FUTURE INCLUSION	--	--	--	--	--	--
COM	O	15.020	COMMENT	AN	2	128	0	1	128
RSV		15.021 15.199	RESERVED FOR FUTURE INCLUSION	--	--	--	--	--	--

Ident	Cond. code	Field Number	Field Name	Char type	Field size per occurrence		Occur count		Max byte count
					min.	max.	min	max	
UDF	O	15.200 15.998	USER-DEFINED FIELDS	--	--	--	--	--	--
DAT	M	15.999	IMAGE DATA	B	2	--	1	1	--

Table 13.2 - Palm Impression Type

Description	Code
Live-scan palm	10
Nonlive-scan palm	11
Latent palm impression	12
Latent palm tracing	13
Latent palm photo	14
Latent palm lift	15

13.1.11 Field 15.011: Compression algorithm (CGA)

This mandatory ASCII field shall specify the algorithm used to compress grayscale images. An entry of "NONE" in this field indicates that the data contained in this record is uncompressed. For those images that are to be compressed, this field shall contain the preferred method for the compression of tenprint fingerprint images. For grayscale images, the domain registrar maintains a registry of acceptable compression techniques and corresponding codes that may be used as they become available.

13.1.12 Field 15.012: Bits per pixel (BPX)

This mandatory ASCII field shall contain the number of bits used to represent a pixel. This field shall contain an entry of "8" for normal grayscale values of "0" to "255". Any entry in this field greater than or less than "8" shall represent a grayscale pixel with increased or decreased precision respectively.

Table 13.3 - Palm Codes, Areas & Sizes

Palm Position	Palm code	Image area (mm ²)	Width (mm)	Height (mm)
Unknown Palm	20	28387	139.7	203.2
Right Full Palm	21	28387	139.7	203.2
Right Writer s Palm	22	5645	44.5	127.0
Left Full Palm	23	28387	139.7	203.2
Left Writer s Palm	24	5645	44.5	127.0
Right Lower Palm	25	19516	139.7	139.7
Right Upper Palm	26	19516	139.7	139.7
Left Lower Palm	27	19516	139.7	139.7
Left Upper Palm	28	19516	139.7	139.7
Right Other	29	28387	139.7	203.2

Palm Position	Palm code	Image area (mm ²)	Width (mm)	Height (mm)
Left Other	30	28387	139.7	203.2

13.1.13 Field 15.013: Palmprint position (PLP)

This mandatory tagged-field shall contain the palmprint position that matches the palmprint image. The decimal code number corresponding to the known or most probable palmprint position shall be taken from Table 13.3 and entered as a two-character ASCII subfield. Table 13.3 also lists the maximum image areas and dimensions for each of the possible palmprint positions.

13.1.14 Field 15.014-019: 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.

13.1.15 Field 15.020: Comment (COM)

This optional field may be used to insert comments or other ASCII text information with the palmprint image data.

13.1.16 Field 15.021-199: 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.

13.1.17 Fields 15.200-998: 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.

13.1.18 Field 15.999: Image data (DAT)

This field shall contain all of the data from a captured palmprint image. It shall always be assigned field number 999 and must be the last physical field in the record. For example, "15.999:" is followed by image data in a binary representation. Each pixel of uncompressed grayscale data shall normally be quantized to eight bits (256 gray levels) contained in a single byte. If the entry in BPX Field 15.012 is greater or less than 8, the number of bytes required to contain a pixel will be different. If compression is used, the pixel data shall be compressed in accordance with the compression technique specified in the CGA field.

13.2 *End of Type-15 variable-resolution palmprint image record*

For the sake of consistency, immediately following the last byte of data from field 15.999 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-15 record.

13.3 *Additional Type-15 variable-resolution palmprint image records*

Additional Type-15 records may be included in the file. For each additional palmprint image, a complete Type-15 logical record together with the “FS” separator is required.

APPENDIX 1 ASCII Separator Codes

ASCII Position ¹	Description
FS 1/12	Separates logical records of a file.
GS 1/13	Separates fields of a logical record.
RS 1/14	Separates the subfields of a record field.
US 1/15	Separates individual information items of the field or subfield.

¹ This is the position as defined in the ASCII standard.

APPENDIX 2 Calculation of Alpha-Numeric Check Character

For TCN and TCR (Fields 1.009 and 1.010):

The number corresponding to the check character is generated using the following formula:

$$(YY * 10^8 + SSSSSSSS) \text{ Modulo } 23$$

Where YY and SSSSSSSS are the numerical values of the last two digits of the year and the serial number respectively.

The check character is then generated from the look-up table given below.

Check Character Look-up Table

1-A	9-J	17-T
2-B	10-K	18-U
3-C	11-L	19-V
4-D	12-M	20-W
5-E	13-N	21-X
6-F	14-P	22-Y
7-G	15-Q	0-Z
8-H	16-R	

APPENDIX 3 Character Codes

A5.1 7-bit ANSI code for information interchange

+	0	1	2	3	4	5	6	7	8	9
30				!	"	#	\$	%	&	'
40	()	*	+	,	-	.	/	0	1
50	2	3	4	5	6	7	8	9	:	;
60	<	=	>	?	@	A	B	C	D	E
70	F	G	H	I	J	K	L	M	N	O
80	P	Q	R	S	T	U	V	W	X	Y
90	Z	[\]	^	_	`	a	b	c
100	d	e	f	g	h	i	j	k	l	m
110	n	o	p	q	r	s	t	u	v	w
120	x	y	z	{		}	~			

APPENDIX 4 Transaction Summary

Type 1 Record (mandatory)

Identifier	Field Number	Field Name	APC	USA	UPR	IRQ	SRE	IMR	ERR
LEN	1.001	Logical Record Length	M	M	M	M	M	M	M
VER	1.002	Version Number	M	M	M	M	M	M	M
CNT	1.003	File Content	M	M	M	M	M	M	M
TOT	1.004	Type of Transaction	M	M	M	M	M	M	M
DAT	1.005	Date	M	M	M	M	M	M	M
PRY	1.006	Priority	M	M	M	M	M	M	M
DAI	1.007	Destination Agency	M	M	M	M	M	M	M
ORI	1.008	Originating Agency	M	M	M	M	M	M	M
TCN	1.009	Transaction Control Number	M	M	M	M	M	M	M
TCR	1.010	Transaction Control Reference	-	-	-	-	M	M	M
NSR	1.011	Native Scanning Resolution	M	M	M	M	M	M	M
NTR	1.012	Nominal Transmitting Resolution	M	M	M	M	M	M	M
DOM	1.013	Domainname	M	M	M	M	M	M	M
GMT	1.014	Greenwich mean time	M	M	M	M	M	M	M

Under the Condition Column:

O= Optional;

M= Mandatory;

C= Conditional if transaction is a response to the origin agency

Type 2 Record (mandatory)

Identifier	Field Number	Field Name	APC	USA	IRQ		SRE	IMR	ERR
LEN	2.001	Logical Record Length	M	M	M		M	M	M
IDC	2.002	Image Designation Character	M	M	M		M	M	M
SYS	2.003	System Information	M	M	M		M	M	M
MN1	2.012	Miscellaneous Identification Number	M	M	M		M	M	M
MN2	2.013	Miscellaneous Identification Number 2	M	M	M		M	M	M
DPR	2.019	Date Fingerprinted	M	M	M		M	M	M
RFP	2.021	Reason Fingerprinted	M	M	M		M	M	M
POA	2.022	Place Of Arrest	M	M	M		M	M	M
OBU	2.023	Owning Bureau	O	O	O		O	O	O
NAM	2.030	Name							
MNA	2.031	Maiden Name	O	O	O		O	O	O
ADD	2.032	Address	O	O	O		O	O	O
AKA	2.034	Aliases	O	O	O		O	O	O
DOB	2.035	Date of Birth	M	M	M		M	M	M
POB	2.037	Place of Birth	M	M	M		M	M	M
NAT	2.038	Nationality	M	M	M		M	M	M
SEX	2.039	Sex	M	M	M		M	M	M
PSP	2.047	Passport Number	O	O	O		O	O	O
OCC	2.049	Occupation	O	O	O		O	O	O
MDO	2.051	Modus Operandi	M	M	M		M	M	M
INF	2.063	Additional Information	O	O	O		O	O	O
RLS	2.064	Respondents List							
ERM	2.074	Status/Error Message Field							
FPR	2.083	Finger Present							
National field definitions									
MNM	2.200	Mother's Name	M	M	M		M	M	M
FMN	2.201	Father's Name	M	M	M		M	M	M
CST	2.202	Civil Status	O	O	O		O	O	O
ISO	2.203	Information Source	O	O	O		O	O	O
NID	2.204	National ID	M	M	M		M	M	M
CTY	2.205	Crimetype	M	M	M		M	M	M
HGT	2.230	Height	M	M	M		M	M	M
WGT	2.231	Weight	M	M	M		M	M	M
HCO	2.232	HairColor	C	C	C		C	C	C
HTY	2.233	HairType	C	C	C		C	C	C
ECO	2.234	EyeColor	C	C	C		C	C	C
RAC	2.235	Race							
BLD	2.236	Build							
HAI	2.237	FacialHair							
ECO	2.238	Eye conditions							
PTY	2.261	Process Type							
NNO	2.262	Name of Officer	O	O	O		O	O	O
PNO	2.263	Phone Number of Officer	O	O	O		O	O	O

The remaining fields can be filled in only after starting the Imagetrak system.

Under the Condition Column: O= Optional;

M= Mandatory;

C= Conditional if data is available

Type 4 Record**Mandatory for APC&IMR Transactions**

Binary data defined in chapter 4

Type 8 Record**Optional for APC Transactions**

Binary data defined in chapter 8

Type 10 Record**Optional for APC Transactions**

Binary data defined in chapter 10

Type 13 Record**Manatory for USA transactions**

Ident	Cond. code	Field Number	Field Name	Char type	Field size per occurrence		Occur count		Max byte count
					min.	max.	min	max	
LEN	M	13.001	LOGICAL RECORD LENGTH	N	4	8	1	1	15
IDC	M	13.002	IMAGE DESIGNATION CHARACTER	N	2	5	1	1	12
IMP	M	13.003	IMPRESSION TYPE	A	2	2	1	1	9
SRC	M	13.004	SOURCE AGENCY / ORI	AN	6	35	1	1	42
LCD	M	13.005	LATENT CAPTURE DATE	N	9	9	1	1	16
HLL	M	13.006	HORIZONTAL LINE LENGTH	N	4	5	1	1	12
VLL	M	13.007	VERTICAL LINE LENGTH	N	4	5	1	1	12
SLC	M	13.008	SCALE UNITS	N	2	2	1	1	9
HPS	M	13.009	HORIZONTAL PIXEL SCALE	N	2	5	1	1	12
VPS	M	13.010	VERTICAL PIXEL SCALE	N	2	5	1	1	12
CGA	M	13.011	COMPRESSION ALGORITHM	A	5	7	1	1	14
BPX	M	13.012	BITS PER PIXEL	N	2	3	1	1	10
FGP	M	13.013	FINGER POSITION	N	2	3	1	6	25
RSV		13.014 13.019	RESERVED FOR FUTURE DEFINITION	--	--	--	--	--	--
COM	O	13.020	COMMENT	A	2	128	0	1	135
RSV		13.021 13.199	RESERVED FOR FUTURE DEFINITION	--	--	--	--	--	--
UDF	O	13.200 13.998	USER-DEFINED FIELDS	--	--	--	--	--	--
DAT	M	13.999	IMAGE DATA	B	2	--	1	1	--

Key for character type: N = Numeric; A = Alphabetic; AN = Alphanumeric; B = Binary

Type 14 Record**Table 12.1 – Type-14 variable-resolution tenprint record layout
Optimal for APC transactions**

Ident	Cond. code	Field Number	Field Name	Char type	Field size per occurrence		Occur count		Max byte count
					min.	max.	min	max	
LEN	M	14.001	LOGICAL RECORD LENGTH	N	4	8	1	1	15
IDC	M	14.002	IMAGE DESIGNATION CHARACTER	N	2	5	1	1	12
IMP	M	14.003	IMPRESSION TYPE	A	2	2	1	1	9
SRC	M	14.004	SOURCE AGENCY / ORI	AN	6	35	1	1	42
TCD	M	14.005	TENPRINT CAPTURE DATE	N	9	9	1	1	16
HLL	M	14.006	HORIZONTAL LINE LENGTH	N	4	5	1	1	12
VLL	M	14.007	VERTICAL LINE LENGTH	N	4	5	1	1	12
SLC	M	14.008	SCALE UNITS	N	2	2	1	1	9
HPS	M	14.009	HORIZONTAL PIXEL SCALE	N	2	5	1	1	12
VPS	M	14.010	VERTICAL PIXEL SCALE	N	2	5	1	1	12
CGA	M	14.011	COMPRESSION ALGORITHM	A	5	7	1	1	14
BPX	M	14.012	BITS PER PIXEL	N	2	3	1	1	10
FGP	M	14.013	FINGER POSITION	N	2	3	1	6	25
RSV		14.014 14.019	RESERVED FOR FUTURE DEFINITION	--	--	--	--	--	--
COM	O	14.020	COMMENT	A	2	1 28	0	1	128
RSV		14.021 14.199	RESERVED FOR FUTURE DEFINITION	--	--	--	--	--	--
UDF	O	14.200 14.998	USER-DEFINED FIELDS	--	--	--	--	--	--
DAT	M	14.999	IMAGE DATA	B	2	--	1	1	--

Key for character type: N = Numeric; A = Alphabetic; AN = Alphanumeric; B = Binary

Type 15 Record**Optional for APC transactions**

Identifier	Field Number	Field Name	APC	IMR
LEN	15.001	LOGICAL RECORD LENGTH	C	C
IDC	15.002	IMAGE DESIGNATION CHARACTER	C	C
ICP	15.003	ICPRESSION TYPE	C	C
SRC	15.004	SOURCE AGENCY / ORI	C	C
PCD	15.005	PALCPRINT CAPTURE DATE	C	C
HLL	15.006	HORIZONTAL LINE LENGTH	C	C
VLL	15.007	VERTICAL LINE LENGTH	C	C
SLC	15.008	SCALE UNITS	C	C
HPS	15.009	HORIZONTAL PIXEL SCALE	C	C
VPS	15.010	VERTICAL PIXEL SCALE	C	C
CGA	15.011	COCPRESSION ALGORITHM	C	C
BPX	15.012	BITS PER PIXEL	C	C
PLP	15.013	PALCPRINT POSITION	C	C
RSV	15.014 15.019	RESERVED FOR FUTURE INCLUSION		-
COC	15.020	COCCENT		-
RSV	15.021 15.199	RESERVED FOR FUTURE INCLUSION		-
UDF	15.200 15.998	USER-DEFINED FIELDS		-
DAT	15.999	ICAGE DATA	C	C

Under the Condition ColuCn:

O= Optional;

C= Candatory;

C= Conditional if data is available

APPENDIX 5 Base-64 encoding scheme

The base-64 Content-Transfer-Encoding is designed to represent arbitrary sequences of octets in a form that need not be humanly readable. The encoding and decoding algorithms are simple, but the encoded data is consistently only about 33 percent larger than the unencoded data. This encoding is virtually identical to the one used in Privacy Enhanced Mail (PEM) applications, as defined in RFC 1421. The base-64 encoding is adapted from RFC 1421, with one change: base-64 eliminates the "*" mechanism for embedded clear text.

A 65-character subset of US-ASCII is used, enabling 6 bits to be represented per printable character. (The extra 65th character, "=", is used to signify a special processing function.)

NOTE: This subset has the important property that it is represented identically in all versions of ISO 646, including US ASCII and all characters in the subset are also represented identically in all versions of EBCDIC. Other popular encodings, such as the encoding used by the uuencode utility and the base-85 encoding specified as part of Level 2 PostScript, do not share these properties, and thus do not fulfill the portability requirements a binary transport encoding for mail must meet.

The encoding process represents 24-bit groups of input bits as output strings of 4 encoded characters. Proceeding from left to right, concatenating 3 8-bit input groups forms a 24-bit input group. These 24 bits are then treated as 4 concatenated 6-bit groups, each of which is translated into a single digit in the base-64 alphabet. When encoding a bit stream via the base-64 encoding, the bit stream must be presumed to be ordered with the most significant bit first. That is, the first bit in the stream will be the high-order bit in the first byte, and the eighth bit will be the low-order bit in the first byte, and so on.

Each 6-bit group is used as an index into an array of 64 printable characters. The character referenced by the index is placed in the output string. These characters, identified in Table C1, below, are selected so as to be universally representable, and the set excludes characters with particular significance to SMTP (e.g., ".", CR, LF) and to the encapsulation boundaries defined in this document (e.g., "-").

The output stream (encoded bytes) must be represented in lines of no more than 76 characters each. All line breaks or other characters not found in Table C1 must be ignored by decoding software. In base-64 data, characters other than those in Table C1, line breaks, and other white space probably indicate a transmission error, about which a warning message or even a message rejection might be appropriate under some circumstances.

Value / Encoding	Value / Encoding	Value / Encoding	Value / Encoding
0 / A	17 / R	34 / I	51 / z
1 / B	18 / S	35 / j	52 / 0
2 / C	19 / T	36 / k	53 / 1
3 / D	20 / U	37 / l	54 / 2
4 / E	21 / V	38 / m	55 / 3
5 / F	22 / W	39 / n	56 / 4
6 / G	23 / X	40 / o	57 / 5
7 / H	24 / Y	41 / p	58 / 6

Value / Encoding	Value / Encoding	Value / Encoding	Value / Encoding
8 / I	25 / Z	42 / q	59 / 7
9 / J	26 / a	43 / r	60 / 8
10 / K	27 / b	44 / s	61 / 9
11 / L	28 / c	45 / t	62 / +
12 / M	29 / d	46 / u	63 / /
13 / N	30 / e	47 / v	
14 / O	31 / f	48 / w	(pad) / =
15 / P	32 / g	49 / x	
16 / Q	33 / h	50 / y	

Special processing is performed if fewer than 24 bits are available at the end of the data being encoded. A full encoding quantum is always completed at the end of a body. When fewer than 24 input bits are available in an input group, zero bits are added (on the right) to form an integral number of 6-bit groups. Padding at the end of the data is performed using the '=' character. Since all base-64 input is an integral number of octets, only the following cases can arise: (1) the final quantum of encoding input is an integral multiple of 24 bits; here, the final unit of encoded output will be an integral multiple of 4 characters with no "=" padding, (2) the final quantum of encoding input is exactly 8 bits; here, the final unit of encoded output will be two characters followed by two "=" padding characters, or (3) the final quantum of encoding input is exactly 16 bits; here, the final unit of encoded output will be three characters followed by one "=" padding character.

Because it is used only for padding at the end of the data, the occurrence of any '=' characters may be taken as evidence that the end of the data has been reached (without truncation in transit). No such assurance is possible, however, when the number of octets transmitted was a multiple of three.

Any characters outside of the base-64 alphabet are to be ignored in base-64-encoded data. The same applies to any illegal sequence of characters in the base-64 encoding, such as "====,,".

Care must be taken to use the proper octets for line breaks if base-64 encoding is applied directly to text material that has not been converted to canonical form. In particular, text line breaks must be converted into CRLF sequences prior to base-64 encoding. The important thing to note is that this may be done directly by the encoder rather than in a prior cannibalization step in some implementations.

NOTE: There is no need to worry about quoting apparent encapsulation boundaries within base-64-encoded parts of multipart because no hyphen characters are used in the base-64 encoding.