Machine Readable Table (MRT) Definitions

for use with

BioCTS ANSI/NIST-ITL MRT Applications

Updated by NIST-ITL CSD

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Version 1.9.1

Contents

Introduction

This MRT definitions document was not originally produced by NIST, but this version of the document was updated by NIST-ITL CSD during the development of the Biometric Conformance Testing Software for ANSI/NIST-ITL (AN-ITL) MRT applications, known collectively as BioCTS AN MRT. All updated text is shown in red. The content in this document is based on the previous version (Version 1.9). This version of the document is provided for use with BioCTS AN MRT applications, and may not apply broadly to other uses of MRT documents.

What are Machine Readable Tables (MRTs)?

The Machine Readable Tables are a set of files which which take table-based definitions for fields and transactions as defined in the ANSI/NIST-ITL standard and associated application profiles (e.g. EBTS, INT-I) and convert them into a machine-readable format. The purpose is to have standard tables that are hosted as a standard machine-readable definition of all the content in the various field tables in ANSI/NIST-ITL 1-2011 and 1-2013, with separate files for FBI EBTS (identical format for ANSI/NIST tables, but expanded to cover transactions). The set of files is designed for any system needing to parse, edit, create, and/or check ANSI/NIST-derived transactions. The master format of the MRTs is XML (EXtensible Markup Language), which can be easily manipulated into various other formats.

What is in this Document?

This document describes the format of the MRTs. It explains the information contained in each MRT, defines the MRT column headers, and lists additional discussions, examples, and issues. This document also contains definitions specific to the MRT use in BIoCTS AN MRT applications. For a complete definition of the types of XML elements supported, refer to the XML Schema files for each MRT document type.

General Guidelines for Tables

- Each MRT is named with the standard/application profile name followed by one of the MRT types mentioned above. For example, ANSI/NIST-ITL 1-2011 contains the *AN2011-FieldDefinition, AN2013e (2011+)-FieldDefinition, AN2011-RecordTypeDesc,* and *AN2011-LookupCodes* MRT, and EBTS v10.0.5 contains the *FBIEBTS10.0.5-FieldDef*, *FBIEBTS10.0.5-LookupCodes*, *FBIEBTS10.0.5-TOTrecord*, *FBIEBTS10.0.5-TOTfields*, *FBIEBTS10.0.5-TOTFieldDetail,* and *FBIEBTS10.0.5-RecordTypeDesc* MRT.
- In general, entries in all tables are limited to 7-bit ASCII characters: characters represented on standard US keyboards (from 0x20 (space) to 0x7E (~)).
- Quotation marks shall always use the straight marks from the keyboard, not the "curly" quotation marks substituted by some editing software. Likewise, dashes shall always use the minus sign from the keyboard, not the em-dash and en-dash substituted by some editing software.
- The field definition rules are additive and a field must pass all of them to be in compliance. Therefore, in the *FieldDefinition* MRTs, a field must comply with each of the columns: ValueRange, CodeTable, and RegExpression. For example, if a CodeTable XX contains the values 1, 2, and 3, and the ValueRange states "{1,2}" (meaning that either value '1' or '2' is allowed), this means that the field is only allowed to contain either value '1' or '2' from the CodeTable XX. The field would have to comply with both the CodeTable and ValueRange in this case.
- The <RemoveRow> element is supported the FieldDefinition, Lookup, RecordTypeDesc, TOTField, TOTFieldDetail, and TOTRecord MRT document types. This presence of the <RemoveRow> element indicates that the element referenced should be removed from the parent MRT before processing the current MRT document and stacking ontop of the parent. Note that in BioCTS AN MRT applications, if a new definition of an element is provided in the child MRT, the element is updated regardless of whether or not <RemoveRow> is present.

Current Status

The following table shows the status of the standards/application profiles:

Standards/Application Profile	Status
ANSI/NIST 2011 & 2011plus (includes error corrections in 2013 – "2013e")	**Complete**
ANSI/NIST 2013	**Complete**
ANSI/NIST 2015	**To be completed**
EBTS v9.3	**Complete**
EBTS v10.0.5 (includes TOU # 1, 2, 3, 4 and 5)	**Complete**

Iris Pilot EBTS v10.0.5 (includes requirements from the EBTS Iris Pilot)	**Complete**

MRTs and Related Documents

I. The **ANSI/NIST MRTs** include*:
   a. *AN2011-FieldDefinition* – Lists all fields for ANSI/NIST 2011 without any 2013 error corrections
   b. *AN2011-LookupCodes* – Lists table codes in ANSI/NIST 2011
   c. *AN2013e (2011+)-FieldDefinition*– Corrects errors (based on ANSI/NIST 2013 error corrections) of fields in *AN2011-FieldDefinition* ; also known as "ANSI/NIST 2011**+**"
   d. *AN2011-RecordTypeDesc* – Describes Record Types in ANSI/NIST 2011
   e. *AN2013na-FieldDefinition* – Lists new information/fields for ANSI/NIST 2013 (lists only fields/subfields/information items which are different from AN2011)
   f. *AN2013-LookupCodes* – Lists table codes in ANSI/NIST 2013
   g. *AN2013-RecordTypeDesc* – Describes Record Types in ANSI/NIST 2013

II. The **EBTS v10.0.5 MRTs** include:
   a. *FBIEBTS10.0.5-FieldDefinition* – Lists all fields for EBTS v10.0.5 (EBTS v10.0.5 includes TOU #1, 2, 3, 4 and 5)
   b. *FBIEBTS10.0.5-LookupCodes* – Lists table codes in EBTS v10.0.5
   c. *FBIEBTS10.0.5-TOTrecords* – Data from EBTS v10.0.5: Tables L-3 and L-4
   d. *FBIEBTS10.0.5-TOTfields* - Data from EBTS v10.0.5: Tables D-1, E-1, and I-1
   e. *EBTS10.0.5TOTFieldDetail* – Information from EBTS v10.0.5 Appendix D Footnotes
   f. *FBIEBTS10.0.5-RecordTypeDesc* – Describes Record Types in EBTS v10.0.5

III. The **Iris Pilot EBTS v10.0.5 MRTs** ** **(Iris Pilot requirements that are in addition to or different from EBTS v10.0.5)** include:
   a. *IRIS_EBTS10.0.5-FieldDefinition* – Lists fields for EBTS v10.0.5 (EBTS v10.0.5 includes TOU #1, 2, 3, 4 and 5 and the Iris Pilot Reqs)
   b. *IRIS_EBTS10.0.5-LookupCodes* – Lists table codes in EBTS v10.0.5
   c. *IRIS_EBTS10.0.5-TOTrecords* – Data from EBTS v10.0.5: Tables L-3 and L-4
   d. *IRIS_EBTS10.0.5-TOTfields* - Data from EBTS v10.0.5: Tables D-1, E-1, and I-1
   e. *IRIS_EBTS10.0.5TOTFieldDetail* – Information from EBTS v10.0.5 Appendix D Footnotes
   f. *IRIS_FBIEBTS10.0.5-RecordTypeDesc* – Describes Record Types in EBTS v10.0.5

IV. The **EBTS 9.3 MRTs** include:

a. *FBIEBTS9.3-FieldDefinition* – Lists all fields for EBTS v9.3
b. *FBIEBTS9.3-LookupCodes* – Lists table codes in EBTS v9.3
c. *FBIEBTS9.3-TOTrecords* – Data from EBTS v9.3: Tables L-3 and L-4
d. *FBIEBTS9.3-TOTfields* - Data from EBTS v9.3: Tables D-1, E-1, and I-1
e. *FBIEBTS9.3TOTFieldDetail* – Information from EBTS v9.3 Appendix D Footnotes
f. *FBIEBTS9.3-RecordTypeDesc* – Describes Record Types in EBTS v9.3

V. ***MRT Definitions_v1.9.1*** (this document)

VI. **Xxxx-KnownErrors.xml**

a. For each version of the specification/standard, there is an XML file called "KnownErrors". This file contains the errors found by the MRT Verify program which checks the content, structure, and syntax of each MRT. The errors shown in these files are exceptions to the normal syntax of the MRTs and do not need correction. Use Appendix A as a reference for MRT Verify codes.

VII. **configurations.xml**

a. This file lists standard/specification versions and their parent standard/specifications, and the MRTs which correspond to that version.

*Note 1:

- ANSI/NIST 2011 consists of the following MRTs: *AN2011-FieldDefinition*, *AN2011-LookupCodes*, *AN2011-RecordTypeDesc,* and *AN2013e (2011+)-FieldDefinition*.
- ANSI/NIST 2013 consists of the following MRTs: *AN2011-FieldDefinition*, *AN2013e-FieldDefinition*, *AN2013na-FieldDefinition*, and *AN2013-LookupCodes*. The AN2013 FieldDefinition MRT (contains new and changed fields to AN2011) layers on top of the AN2011 Field Definition MRTs.

**Note 2:

- The EBTS Iris Pilot MRTs layer on top of the EBTS v10.0.5. Therefore, to include the Iris Pilot requirements in the MRT, use the Iris Pilot EBTS MRTs as well as the EBTS v10.0.5 MRTs.

FieldDefinition

The *FieldDefinition* MRT defines columns for a general-purpose table-based definition for each field in the record types, as defined in application profiles and ANSI/NIST-ITL. For ANSI/NIST, it contains all fields found in the standard. For application profiles, it includes fields which exist in the application profile only (not defined in ANSI/NIST) and ANSI/NIST fields which were edited by the application profile. Unless otherwise stated, all examples are derived from the ANSI/NIST-ITL 2011 MRT.

Column Name	Column Definition	Required in MRT	Example
TradXML	States whether the field/row is formatted as XML only (“X”), Traditional only (“T”), or both XML and Traditional (“TX”).	Required	TX (for 1.003) X (for 1.002:X2)
FieldRef	FieldRef is a unique reference to a row in this table and equals the string [RecordNum/FieldMnemonic/InfoItemMnemonic]. A unique reference to this field or info item is necessary because field mnemonics are only unique within their record, and infoitem mnemonics are only unique within their field. Special cases: • When a single field/info item is represented with more than one row (ContentType=Data_T or Data_X), the row for the traditional field is suffixed ":T" and the row for the XML field is suffixed with ":X"(e.g., 01.001:X) • If one traditional field corresponds to multiple XML elements (ContentType= Data_NX-1T, or Set_X), the constituent XML elements are suffixed with ":X1", ":X2", etc. • If an XML path applies to multiple fields or infoitems, the format shall be “[lowest field]_[highest field]”. Note that the XML path does not necessarily apply to all fields within that range. This is used to represent an XML parent which encompasses many different fields or an XML element and path which applies to multiple fields. Note: BioCTS AN MRT applications resolve this issue by checking for an “AppliesTo{}” entry in the <TechNotes> element. See BioCTS documentation for more information.	Required	9/MIN (for 9.331, which contains multiple information items) 9/MIN/MRU (fifth information item in 9.331) 1/VER:X1 (first XML element for 1.002) 1/LEN:T (for field 1.001:T) 4/IMP_4/DATA (XML set which applies to fields 4.003 through 4.009)

Column Name	Column Definition	Required in MRT	Example
FieldID	FieldID is a unique reference to a row in this table. It uses the field numbers and field order traditionally used in ANSI/NIST, formatted as [Record.Field number-InfoItem]. Three decimal places are always used (e.g. 01.004 or 14.016), with the exception of record two in which up to 4 decimal places are allowed (e.g. FBI EBTS 02.2033). Record types should be indicated using 2 digits. Special cases: • If an XML path encompasses multiple fields and/or infoItems and contains no data, the format shall be "[lowest field]_[highest field]" • If the FieldID is not otherwise unique, suffixes are added after a colon as described in FieldRef (e.g. ":X", ":T" ":X1")	Required	[01.004] [01.015-A] [01.003-2A_01.003-2B] [01.011:T] [01.011:X] [09.300-E:X2]
InfoItem	Information items are lettered explicitly, starting with "A". "SET" indicates the field contains one or more sets of information items. Note: "Information Item" is used as defined in ANSI/NIST; note that EBTS uses the term "subfield" to refer to these entities. For this reason, we do not use the term "subfield" here, but use the term "occurrence" to refer to repeated instances of a field (as used in EBTS).	Required if ContentType is Set or Set_T, otherwise Optional	A (=1st infoitem in RecordNum.FieldNum) SET (= header row for a field that has InfoItems)
InfoItemCount	If InfoItem="SET", this indicates the number of unique information items included. Special cases: • If InfoItemsVary="TYPE", this indicates the number of information items that can be contained in a given occurrence of a field • If InfoItemsVary="NUM" this is omitted	Optional	7 (for 9.331, the field contains 7 InfoItems, lettered A..F) 2 (for 1.003, which has InfoItemsVary="TYPE" and 2 info items per occurrence) Omitted (for 14.025, which has InfoItemsVary="NUM")
InfoItemsVary	Information item exception (rare: this exists solely to address a few ANSI/NIST and EBTS special-case fields). In general, a field with information items contains a defined list of information items that are repeated for each occurrence. This deals with the exceptions.	Optional	NUM (for 14.025, which contains a variable number of infoitems (2+ # of vertices)

Column Name	Column Definition	Required in MRT	Example
	• InfoItemsVary = "NUM" to indicate a field in which the number of information items varies (e.g., 14.025), or to indicate the information items that vary in such a field (e.g., 14.025-C and 14.025-D, but not 14.025-A and 14.025-B) • InfoItemsVary = "TYPE" to indicate a field where the type of information items differs by a field's occurrence (e.g., 1.003). For information items that vary by occurrence, this indicates the field occurrence number (e.g., "1" would represent the first occurrence of the field), or ">=" followed by an occurrence number (e.g., ">=2" which means that the information item is only allowed to occur in the second, third, etc. occurrence of the field – this information item would not be allowed in the first occurrence of the field).		NUM (for FBI EBTS 2.074) NUM (for 14.025-C, which is a repeating infoitem) TYPE (for 1.003, which has different information items for the first occurrence than the other occurrences) 1 (for 1.003-A or 1.003-B, which are only used in the first occurrence) >=2 (for 1.003-C or 1.003-D, which are used for the 2nd and greater occurrences)
Mnemonic	Alphanumeric Field Identifier of at least 2 characters as stated in ANSI/NIST-ITL or application profile. May be repeated within a field or InfoItem that consists of more than one row in the MRT (e.g., 1.002), but is unique for each field in a record type (e.g., mnemonic VER is used for field 1.002 in record 1 and for no other record 1 field). Note: XRCC was created as a mnemonic for xx.001 fields since the original mnemonic RCC is not unique in T9. Note: For BioCTS AN MRT applications, the Mnemonic value "UDF" signals that the field or field number range defines user-defined fields. This means that even if no FieldDefitions are included for those fields, their presence in the transaction is valid (but not testing will be performed).	Required, except for record XML headers (e.g., [01]) and XML parents encompassing multiple fields (e.g., 1/VER_1/ANM)	VER (for 1.002) NSR (for 1.011:X)
Description	Definition of field, identical to Content Description in ANSI/NIST, Field Name in EBTS, or other description in an application profile.	Required	Destination Agency Identifier (for field 1.007)

Column Name	Column Definition	Required in MRT	Example
	For XML elements that do not correspond directly to traditional fields/info items (and therefore have no definition), copy the XML element name or traditional field description and suffix “(XML)”		
CondCode	M = Mandatory O = Optional M^ = Mandatory InfoItem (or XML element) within the field O^ = Optional InfoItem (or XML element) within the field D = presence is dependent upon other fields/information items, or other conditions, detailed in one of the following: DependPresenceReq, DependPresenceOpt, DependAbsence, DependValue, DependValueReq, DependValueOpt, DependOther, Exception Note: • The caret (^) symbol is used here rather than the up arrow used in ANSI/NIST so that the contents of this file are always parseable as 7-bit ASCII. • The caret (M^ or O^) is only used for XML elements that are enclosed in a field (i.e. are groups or subdivisions of InfoItems within a field).	Required, except for Type-2 fields in EBTS	M (for 1.003) M^ (for 1.003-A) D (for 9.126:T)
DataType	Derived from the ANSI/NIST Character Type, but with additional delineation of data types. Omitted if ContentType = "Set_X", “Set_T” or “Set. See ANSI/NIST section 5.5. For dates, see ANSI/NIST sec 7.7.2. Data Types defined in ANSI/NIST 2011 section 5.5: • A = Alphabetic: 26 English letters, both upper and lower case) • N = Numeric (1 2 3 4 5 6 7 8 9 0) • AN = Alphanumeric: Alphabetic and numeric • S = used in combination with A, N, or AN representation to indicate Special characters. The specific characters permitted are listed in SpecialChar and SpecialNonPrintingChar • B = Binary for Traditional or Base64 for XML • Base64 = Base-64 encoded (exclusively), for both traditional and XML • H = Hexadecimal (0..9, A..F) • U = Unicode characters Data Type unique to MRTs:	Required, except if ContentType = "Set_X", “Set_T” or “Set”	ANS (for 1.007) D (for 1.005:X) B (for 10.999) GMT (for 1.014:T) Base64 (for 9.372) U (for 9.127-B)

Column Name	Column Definition	Required in MRT	Example
	• Y = yes/no, Boolean: field indicated as Y|N in traditional, true|false or 1|0 in XML		H (for 9.126-C)
MinLength	Minimum number of characters. Does not include separators for traditional encoding.	Required, except if ContentType = "Set_X", “Set_T” or “Set	5 (for 1.011:T)
MaxLength	Maximum number of characters. Does not include separators for traditional encoding. Set to "*" if there is no maximum.	Required, except if ContentType = "Set_X", “Set_T” or “Set	20 (for 1.014:X) * (for 1.008)
MinOccur	Minimum number of occurrences (cardinality) of the field. Set to 1 if the field/info item is required, 0 if optional.	Required, except for EBTS Type-2 fields (required for Type-2 Info Items)	1 (for 1.009) 0 (for 1.010)
MaxOccur	Maximum number of occurrences (cardinality) of the field. Set to "*" if there is no maximum. A field with >1 maximum occurrences will have multiple subfields (using the ANSI/NIST definition); these subfields repeat sets of information items (if InfoItem="SET"). For example, in AN 2011, field 1.016 has a min and max occurrence of 0..1 for the field and 1..99 for repeating subfields. Therefore, in the MRT, the min and max occurrence is set to 99.	Required	1 (for 1.015-B) * (for 9.320)
SpecialChar	For fields with DataType “S”, this explicitly lists the permissible printable characters in brackets to prevent parsing issues in spreadsheets (which otherwise would have issues with quotes). Characters listed here must be in the ASCII range chr(33) through chr(126) (! through ~ - See AN2013 Table 116) Special Case:	SpecialChar and/or NonPrintChar required for fields with DataType “S” (i.e.,	ALL (for field 1.007) [,-] (for field 9.357-B:T)

Column Name	Column Definition	Required in MRT	Example
	• If all printable 7-bit ASCII characters are permitted, set SpecialChar="ALL". Note that "ALL" is not put in brackets and does not include blanks, which must be explicitly specified in NonPrintChar.	DataType = AS, ANS, NS, S)	
NonPrintChar	For fields with DataType "S" that permit non-printing characters, this can be set to one or more of the following: • \s (space) • \t (tab) • \n (newline) Multiple values are comma separated. It is assumed that \n permits CR and/or LF (chr(13) and chr(10))	SpecialChar and/or NonPrintChar required for fields with DataType "S" (i.e., DataType = AS, ANS, NS, S)	\s (spaces are permitted, for field 1.017) \s,\t,\n (spaces, tabs and newlines, are permitted, for field 2.2102 in EBTS)
ContentType	Denotes how the data of a unique FieldID/FieldRef is formatted. If TradXML="TX", then the following values are allowed: • "Set" – Encloses infoitems and XML elements that contain data • "Data" – Field represented by in traditional and XML format; contains data For those fields which there is not a 1:1 correspondence (TradXML = "X" or "T") between the traditional fields/infoItems and XML tags, there are codes are used to indicate categories of differences: • "Data_1T-NX"- single traditional field/infoItem that is represented as multiple XML tags (XML path includes all such elements; counterpart to Data_NX-1T) • "Data_NX-1T"- XML tag that represents a portion of a single traditional field/infoItem (counterpart to Data_1T-NX) • "Data_1X-NT"- single XML field that corresponds to multiple traditional fields/infoitems (counterpart to Data_NT-1X) • "Data_NT-1X"- traditional field/infoitem that represents a portion of an XML element (counterpart to Data_1X-NT) • "Data_T" - Traditional field not represented in XML (e.g. record length fields) • "Data_X" - XML field not represented in traditional format (e.g. record category code)	Required	"Data_1T-NX" (for 9.300-E) "Data_NX-1T" (for 09.300-E:X3, which is a part 9.300-E) "Data_1X-NT" (for 10.043-B_10.043-F) "DATA_NT-1X" (for 10.043-B:T) "Data_T" (for 1.001:T) "Data_X" (for 1.001:X) "Set_T" (for 1.017:T) "Xreuse"

Column Name	Column Definition	Required in MRT	Example
	• "Set_T" - traditional field header (InfoItem="SET") for which there is no XML equivalent, because XML refers to the constituent info items using a different structure; encloses infoitems that contain data. • "Set_X" - XML group element for which there is no traditional equivalent; encloses XML elements that contain data. • For an XML path/element that corresponds to more than one traditional field/infoitem, BioCTS AN MRT applications resolve this issue by checking for an "AppliesTo{}" entry in the <TechNotes> element. See BioCTS documentation for more information.		(for ebts:CandidateMatchScoreValue, which corresponds to both 2.089 and 2.2033-G)

XMLPath	The XML path for a field. Includes the XML parent and element.
	
	• The XML path is relative to the record type. In the first example shown, the actual XML path for itl:PackageInformationRecord/biom:RecordCategoryCode is itl:NISTBiometricInformationExchangePackage/itl:PackageInformationRecord/biom:RecordCategoryCode. itl:NISTBiometricInformationExchangePackage is not listed in the XML path since it precludes all record types.
	• There are cases when more than one XML path is allowed depending on the values of a specified field. For these exceptions, use a conditional statement in the format:
	
	if [FieldRef]in{ValueRange} then XMLPath1
	elseif [FieldRef]in{ValueRange} then XMLPath2
	else XMLPath3}
	
	- In place of a value range, a code table may be referenced by using <CodeTable>. For example, if an XML path is dependent on a value in the TMC CodeTable in ANSI/NIST, the user would use "<TMC>" (see example).
	- One "if" statement is required, followed by at least one "elseif" or "else".
	- There may be any number of "elseif" statements, and zero or one "else" statements.
		Required for TradXML fields with X or TX	itl:PackageInformationRecord/biom:RecordCategoryCode
			(for 1.001:X)
			
			if [20/AQS/AQT] IN {7..10, 19..21} then
			itl:PackageSourceRepresentationRecord/biom:SourceVideo/biom:ImageSegment
			else
			itl:PackageSourceRepresentationRecord/biom:SourceImage/biom:ImageSegment
			endif
			(for 20.016)
			
			if [10/TMC] IN {<TMC>} then
			itl:PackageFacialAndSMTImageRecord/biom:FaceImage/biom:FaceImageFeaturePointTierCode
			else
			itl:PackageFacialAndSMTImageRecord/biom:FaceImage/biom:FaceImageFeaturePointTierNumeric
			endif
			(for 10.031)

Column Name	Column Definition	Required in MRT	Example
	If the permissible values are restricted beyond all combinations defined by the data type and the min-max length, the permissible values are defined by one or more of these methods: CodeTable, CodeTableOpt, ValueRange, RegExpression, the Depends*methods, or the InterField* methods.		
CodeTable	For fields limited to a fixed set of values, CodeTable contains text to point to the specific lookup table - see the LookupCodes table. ValueRange may be used to refer to a subset of CodeTable (e.g., to refer to finger positions, code table can be set to FGP and value range can be set to [1..10]). Notes: • In determining whether to use CodeTable or ValueRange, use CodeTable if each value has a specific definition. • In the unusual case in which a single field points to two tables (e.g., 10.026), the code table names are separated by a semicolon (";"). A semicolon indicates that the field can use codes from one or more of the code tables listed. Semicolons shall not be used in code table names.	Optional	SAP (field 10.013 would set CodeTable to "SAP", and the LookupCodes table would contain the contents of Table 10 in ANSI/NIST under the CodeTable value "SAP") SXS;SMT (for field 10.026, which allows facial description codes and/*or* SMT codes)
CodeTableOpt	CodeTable Options: • Set to "Opt" if the CodeTable is optional (defining commonly-used or special-purpose values) rather than definitive (listing all possible values). • Set to "Part" if the code table applies only to some of the characters of the field (example: EBTS state ID (2/SID) has 2-character state abbreviations, followed by an alphanumeric, so the code table includes entries for e.g., AL, AK, etc., which only apply to the initial characters of the field).	Optional	Opt (for 1.015-A) Part (for 9.308)
ValueRange	Defines the permissible values of a field, specified as one or more of the following: Conditional Types • {>=value} represents minimum value (numeric only) • {>value} greater than value (numeric only) • {<=value} represents maximum value (numeric only) • {<value} less than value (numeric only) Equality and Set Comparison Types: • {value} represents a single value • {value1,value2,value3} represents multiple values	Optional	{0500} (for 1.002:T) {2,4,7..10,13..21,98,99} (for 1.003-2A) {"PRX","DST","MED","UNK"} (for 9.302-B) {"U"} (for 9.004:T)

Column Name	Column Definition	Required in MRT	Example
	• {value1..value2} represents a range Notes: • Values to be compared as strings are enclosed in quotes (e.g., {"A.."Z"}). • All Comparison Type entries are grouped together into a logical AND, while all other types are grouped by logical OR. For example, >=1, <100, 255 is evaluated as "greater than or equal to 1 AND less than 100" OR "equal to 255". • A given range cannot contain both numeric and non-numeric data - e.g., these are not acceptable ranges: {1.."A"} or {0.."32UTF"} • Numbers can be negative or contain decimals (e.g., {-22.5..22.5}) • Numbers that are not enclosed in quotes are compared as numerics (e.g. 7 is less than 10), not strings (e.g., "7" is greater than "10"). • For ranges of strings enclosed in a single bracket (e.g., {"ABC.."BDE"}), the values must be of the same length and only may include uppercase letters and digits, and the second string must be greater than the first in ASCII order. (e.g., these are NOT permissible ValueRanges: {"abc.."B1","Z.."A"} • When multiple attributes restrict values (e.g., ValueRange and InterFieldValue and CodeTable), the valid fields must satisfy ALL of the restrictions. For example a field with ValueRange={0..49999} and InterFieldValue<9/ROI/EWI must satisfy both.		{>=1} (for 9.137-B) {1..99,"L","U"} (for 9.322-A)
RegExpression	Includes a regular expression. For character-level value constraints that cannot be defined precisely in the combination of DataType, CodeTable, SpecialChar, and ValueRange. Format TBD: will most likely be a defined subset of Perl/Java regular expression syntax (most modern regular expression formats are derived from Perl).	Optional	(M[0-9A-F]{12})|([P]\S{12,15}) (for 9.903 DUI: M followed by 12 hexadecimal characters, or P followed by 12 to 15 non-whitespace characters)
	For fields where CondCode="D", one of the following is selected: DependPresenceReq, DependPresenceOpt, DependAbsence, DependValue, DependValueReq, DependValueOpt, or DependOther.		
DependPresenceReq	This field is required if another field is present (and is not permitted otherwise). One or more FieldRefs are included, separated by commas. All fields listed must be present for this field to be required.	Optional	14/DATA (for 14.010, which is mandatory if an image is present in 14.999 DATA)

Column Name	Column Definition	Required in MRT	Example
DependPresenceOpt	This field is optional but is only permitted if another field is present. One or more FieldRefs are included, separated by commas. All fields listed must be present for this field to be permitted.	Optional	18/DGD (Field 18.021 is optional and only permitted if field 18/DGD, 18.020, is present)
DependAbsence	This field is only permitted if another field is absent. One or more FieldRefs are included, separated by commas. All fields listed must be absent for this field to be permitted.	Optional	9/MIN (for 9.334, which is not included if 9.331 MIN is used)
DependValue	This field is required if another field is set to a specific value (and otherwise shall not be entered). The following formats are allowed (multiple entries are separated by commas): • For a single string of characters (alphabetic): [FieldRef] = “XX” • For a single integer: [FieldRef] = ## • If value is one of several values: [FieldRef]IN{“X”, “Y”, “Z”} or [FieldRef]IN{1,2,3} • If value is one in a range: [FieldRef]IN{1..19,40..50} • For single value inequalities: [FieldRef]>## Note: comparison sign can be "<", ">","<=", ">=" ,"!=" • For multiple value inequalities: ##<[FieldRef]<## • Note: comparison sign can be "<", ">","<=", ">=" ,"!="	Optional	[10/POS]="D" (for 10.025, which shall be required when 10.020 POS = "D"; otherwise should not be present) [8/SRT]<2 (for 08.008_08.008:X1) [9/MFD/FME]IN{"AUTO","REV","EDIT"} (for 9.350-C) [18/DLS/UTY]IN{1,2} (for 18.003-C:T)
DependValueReq	This field is required if another field is set to a specific value (but is otherwise optional). See DependValue for more information on formatting.	Optional	[10/SAP]>=40 (for 10.023, which shall be required if 10.013 is greater than or equal to 40; otherwise 10.023 is optional) [14/FGP]=19 (for 14.014)
DependValueOpt	This field is optional if another field is set to a specific value (but otherwise shall not be entered). See DependValue for more information on formatting.	Optional	[9/FPP/FGP]IN{0..10,16..17,20..38,81..84} (for 9.342-E, which is optional only if 9/FPP/FGP, or 9.302-A, contains the listed values; otherwise 9.342 shall not be present) [9/CBI/CFT]IN{514,515}

Column Name	Column Definition	Required in MRT	Example
			(for 9.139) [10/IMT]="FACE",[10/SAP]IN{0..20} (for 10.014)
DependOther	Set to "Y" to indicate that this field is only permitted based on other dependencies not addressed in DependPresence or DependAbsence. A compliance checker must incorporate special logic for such fields. An explanation must be included in TechNotes.	Optional	Y (for 8.005)
	For fields where infoitems are dependent on other infoitems or fields, one of the following is selected: InterFieldOccur, InterFieldCount. InterFieldValue, InterFieldOther, Exception. Note that if a FieldRef listed in one of these does not exist in a particular transaction, then ignore the inter field reference in that instance (e.g., in EBTS v10.0.5, the EQRR TOT contains field 2.079, but not 2.2010. Therefore, the InterFieldValue in field 2.079 would be ignored in this case).		
InterFieldOccur	For fields where the number of occurrences of the field must be equal to the number of occurrences of another field. One or more FieldRefs are included, separated by commas. If InterFieldOccur contains a FieldRef which does not exist in the transaction, then then InterFieldOccur does not apply to the field in that particular instance.	Optional	2/ASL/AOL (for 2.047-A)
InterFieldCount	For fields where the number of occurrences of the field must be equal to the numeric value of another field. One FieldRef is included, indicating the field that contains the value of the occurrence count. If InterFieldCount contains a FieldRef which does not exist in the transaction, then then InterFieldCount does not apply to the field in that particular instance. Notes: • InterFieldCount is NOT defined for the field that is referenced. • This may only be used when the referenced field is limited to a single occurrence. • This can apply to information items, e.g. in 10.015.	Optional	9/NOM (for 9.137, the number of occurrences is stored in 9.136 NOM)
InterFieldValue	For Fields where the permissible values are defined by the values of other fields, this is set to one or more comparative statements, of the form <operator><[FieldRef]>. Multiple statements are comma-separated, and imply a logical AND (all statements must be satisfied). Operators include "=", "<", ">","<=", ">=" and "!=". If InterFieldValue contains a FieldRef	Optional	<[9/ROI/EWI] (For 9.331-A, which must be less than 9.300-A EWI) <=[9/NOM];!=[9/RCI/CMI] (for 9.138-2B)

Column Name	Column Definition	Required in MRT	Example
	which does not exist in the transaction, then then InterFieldValue does not apply to the field in that particular instance. Notes: • It is permissible to use negative values, e.g. ">[-9/EHO]" • This may only be used when the referenced field is limited to a single occurrence. • May be used in combination with ValueRange. When multiple attributes restrict values (e.g. ValueRange and InterFieldValue and CodeTable), the valid fields must satisfy ALL of the restrictions. For example a field with ValueRange of [0..49999] and InterFieldValue of <[9/ROI/EWI] must satisfy both.		
InterFieldOther	Set to "Y" to indicate that the permissible values are restricted by the presence, values, or counts of other fields in ways that cannot be defined by InterFieldValue. A compliance checker must incorporate special logic for such fields. An explanation must be included in TechNotes.	Optional	Y (for 9.126-B)
Exception	Set to "Y" or "true" to indicate that the values for this field are restricted in ways that cannot be completely and explicitly defined addressed through the use of other attributes; otherwise set to "N" or "false". An explanation must be included in TechNotes. A compliance checker must incorporate special logic for such fields.	Optional	Y (for 10.998-J)
Summary	Short summary of field/information item, appropriate for tooltip or other user interface display. Must be written to be appropriate for end user. Limited to alphanumeric, symbols, and space (no CRs or tabs). The summary for both ANSI/NIST and EBTS consists of wording from the text descriptions and XML mapping documents.	Required for all traditional fields	An identification for an organization to which the transaction is being sent (for 1.007)
TechNotes	Technical free text explanation of specific requirements or dependencies of the field. Only used if they cannot otherwise be explicitly defined in this table. This text is intended for technical information related to format or content, as opposed to Summary, for end users. Limited to alphanumeric, symbols, and space (no CRs or tabs).	Required if InterFieldOther="Y", DependOther="Y", or Exception="Y";	UTM zone number ("0".."60") followed by band letter ("C".."H","J"..."N","P".."X") (for 10.998-J)

Column Name	Column Definition	Required in MRT	Example
	Note: BioCTS AN MRT applications check for "AppliesTo{}" entries in the <TechNotes> element to resolve cases where the Content Type of an XML element is 1X_NT. See BioCTS documentation for more information.		
Example	Sample value for that field		false (for 9.004:X)
Changes_to_AN	Changes made to ANSI/NIST 2011 fields in subsequent ANSI/NIST versions (e.g., AN2011plus which lists corrections made to ANSI/NIST 2011 errors as described in comments <2013e> in ANSI/NIST 2013). Applies to ANSI/NIST only and not application profiles.	Optional	Type changed from AN to ANS; added SpecialChar and NonPrintChar (for 1.009 in AN2013e-FieldDef)
Notes	Additional annotations	Optional	
OpenIssues	Unresolved issues	Optional	

LookupCodes

The *LookupCodes* MRT defines the legal values for those fields which specify a value in the CodeTable column of the *FieldDefinitions* MRT.

Column Name	Column Definition	Required in MRT	Example
CodeTable	A set of valid values for a field that are grouped together by sharing a common CodeTable. If a field requires use of a code table, its value is correct if and only if that value is listed in its code table. Notes: • The code table names for application profiles start with the application profile abbreviation and a colon (e.g. FBIEBTS:PATCL) (to avoid conflicts, since an implementation may have more than one application profile in use at the same time). • Code table names without a colon are for the base ANSI/NIST 2011 standard. • Semicolons shall not be used in code table names.	Required	AMPCD
Code	The value saved in the field. Notes: • It is permissible for a single code to appear more than once in the table with a different description. In such cases, the code groups must be different and/or the PrimaryDescription is indicated. • It is permissible to have blank codes.	Required	XX (code in code table AMPCD)
Description	Text displayed to the user which describes the code. Not saved in the transaction.	Required	Partial print due to amputation (description for code XX)
CodeGroup	For long lists, can assist in selection of values. Not saved in the ANSI/NIST transaction.	Optional	Tattoo (for SMT code table)
PrimaryDescription	If (and only if) one Code is listed twice in the same CodeTable, Primary may be set to "Y" to indicate the primary Description and/or CodeGroup that should be used. Note: One Code may be listed twice in the same CodeTable to aid in usability in selecting the correct code, either by having it listed with different descriptions (e.g. NF=Newfoundland (includes Labrador);	Optional	Y (for code SPORT in SMD/TSC code table)

	NF=Labrador (included in Newfoundland)), or to include one code in more than one CodeGroup.		
OpenIssues	Unresolved issues	Optional	
Notes	Additional annotations	Optional	

TOT Records

The *TOTrecords* MRT defines columns for a general-purpose table-based definition for transactions' record set requirements, as defined for application profiles derived from ANSI/NIST-ITL (e.g. EBTS, INT-I). Transactions are not defined for the base ANSI/NIST-ITL standards themselves. Each row represents one type of transaction. The EBTS MRTs are equivalent to the "Record Set Requirements Summary by Type of Transaction" and "Record Set Requirements Summary by Type of Response" tables in FBI EBTS Appendix L.

Column Name	Column Definition	Required in MRT	Example
TransactionFullName	Full name for type of transaction	Required	AMNESIA VICTIM
TOT	Abbreviation for Type of Transaction	Required	AMN
TOT_Description	Provides a brief overview and describes the purpose of the Type of Transaction	Required	The Biometric Delete Response (BDELR) is returned when a successful Biometric Delete Request is completed. If any permission or processing errors are encountered, an error transaction (ERRA) is returned. (for BDELR TOT)
RecordNum	Record Type Number in application profile.	Required	2 (equals Record Type-2)
Record_Min	Minimum number of records. Records not included in the transaction are not listed in TOTrecords.	Required	1 (for Type-1)
Record_Max	Maximum number of records. Records not included in the transaction are not listed in TOTrecords.	Required	14 (for AMN, Type-4)
Notes	Additional annotations	Optional	

TOTfields

The *TOTfields* MRT defines columns for a general-purpose table-based definition for transactions' record set requirements, as defined for application profiles derived from ANSI/NIST-ITL (e.g. EBTS, INT-I). In table format, each row represents a field and TOT combination. Transactions are not defined for the base ANSI/NIST-ITL standards themselves and the EBTS TOTfields MRT is equivalent to Tables D-1, E-1, and I-1 in FBI EBTS.

Column Name	Column Definition	Required in MRT	Example
RecordNum	Record Type Number in application profile.	Required	2 (equals Record Type-2)
FieldNum	Record Field number	Required	12 (equals field 12 within RecordNum)
Mnemonic	Three-letter Field Identifier	Required	LCN (mnemonic for field 2.012)
TOT	Abbreviation for Type of Transaction	Required	AMN
Max	Max number of field occurrences	Required	9 (for field 2.007 of AMN TOT and means that up to 9 occurrences of field 2.007 are allowed for an AMN transaction)
Req	Set to "Y" if field is required for a TOT; otherwise omitted. If a field is optional in ANSI/NIST, it can be made required in the application profile - the reverse is not true.	Optional	Y (for field 2.018 of AMN TOT)
Exc	Indicates additional field requirements for fields which are transaction specific and not covered in this table. • In EBTS, one way the Exc (exception) columns are used is if a table value contains a superscript pointing to an endnote. Endnotes are described in the TOTFieldDetail MRT. • An entry is included in the TOTfieldDetail MRT if and only if TOT-Exc is set to "Y".	Optional	Y (for field 2.018 of AMN TOT)
Notes	Additional annotations	Optional	

TOTFieldDetail

The *TOTFieldDetail* MRT defines columns for transaction-specific field requirements, as defined for application profiles derived from ANSI/NIST-ITL (e.g. EBTS, INT-I). Transactions are not defined for the base ANSI/NIST-ITL standards themselves. In a table format, each row represents a combination of one TOT and one field. An entry in this table is only specified if the TOTfields MRT has a "Y" or “true” in the -Exc (exception) column. In EBTS, most information in this MRT is taken from table endnotes (e.g., Appendix D –Reference Notes in EBTS v10.0).

Column Name	Column Definition	Required in MRT	Example
TradXML	States whether the field/row is formatted as XML only (“X”), Traditional only (“T”), or both XML and Traditional (“TX”).	Required	TX (for RPIS, Field 2.084) T (for CNA, Field 2.005)
TOT	Abbreviation for Type of Transaction	Required	CAR
RecordNum	Record Type Number in application profile.	Required	2 (equals Record Type-2)
FieldNum	Record Field number	Required	14 (equals field 14 within RecordNum)
Mnemonic	Three-letter Field Identifier	Required	FBI (mnemonic for CAR and field 2.014)
Notes	Text notes on additional field details and/or requirements (e.g., FBI EBTS Appendix D endnotes)	Required	App D Note 5: FBI Number must be present if known for inquiry prints. (notes for CAR and field 2.014)
Data Type	See description in FieldDefinition	Optional	AN (for 2.2029 field and BDEL TOT)
ValueRange	See description in FieldDefinition	Optional	[“Y”]
RegExpression	See description in FieldDefinition	Optional	(M[0-9A-F]{12})|([P]\S{12,15}) (for 9.903 DUI: M followed by 12 hexadecimal characters, or P followed by 12 to 15 non-whitespace characters)
FieldReq	States a field which is mandatory if the field and TOT combination described in under TOT, RecNum, FieldNum, and Mnemonic is present.		2/CSL (From App D Note 9: CSL must be included where submission includes SLE)
DependPresenceReq	See description in FieldDefinition	Optional	14/DATA (for 14.010 TVPS, which is mandatory if an image is present in 14.999 DATA)

DependPresenceOpt	See description in FieldDefinition	Optional	18/DGD (Field 18.021 is optional and only permitted if field 18/DGD, 18.020, is present)
DependAbsence	See description in FieldDefinition	Optional	9/MIN (for 9.334 NMIN, which is not included if 9.331 MIN is used)
DependValueReq	See description in FieldDefinition	Optional	2/RET="Y" (from App D Note 2)
InterFieldCount	See description in FieldDefinition	Optional	10/FEC/NOP (for HPO 10/FEC/HPO:T, the number of occurrences of 2.074 FGP and 2.064 CAN must be the same)
InterFieldValue	See description in FieldDefinition	Optional	<[9/ROI/EWI] (For 9.331A MXC, which must be less than 9.300A EWI)

RecordTypeDesc

The *RecordTypeDesc* MRT defines columns for a general-purpose table-based definition for Record Types, as defined in application profiles and ANSI/NIST-ITL. The full name and summary for each record are included.

Column Name	Column Definition	Required in MRT	Example
RecordType	Numeric record representation	Required	1 (for Record Type 1)
RecordName	Full record type name	Required	Transaction Information Record (for Record Type 1)
RecordDescription	Summary of record type.	Required	The Type-1 record provides information describing the type and use or purpose for the transaction involved, a listing of each record included in the transaction, the originator or source of the physical record, and other useful and required information items. Record Type-1 is mandatory… (sample text for Record Type 1)
Notes	Additional annotations	Optional	

Appendix A: MRTVerify Error Codes

Numbers in braces (e.g. {0}) indicate parts of the error message that are filled in by MRTVerify when the error is reported. Use this table as reference when looking at KnownErrors.xml files.

Error Code	Format String	Column(s)	Description
0	Warning/Error/Fatal Error at file {0}, line {1}, char {2} Message: {3}	N/A	DOMError. Error reported by the Xerces-C DOM xml reader.
1	Warning/Error/Fatal Error at file {0}, line {1}, char {2} Message: {3}	N/A	SAXError. Error reported by the Xerces-C SAX2 xml reader.
2	Warning/Error/Fatal Error at file {0}, line {1}, char {2} Message: {3}	N/A	MRT specific read error. Can occur when two or more rows in the table have the same key or when a schema has an invalid id.
3	Schema {0} is not recognized.	N/A	Unknown schema id.
4	FieldRef suffix and FieldID suffix do not match	FieldID	Example: 1/LEN:T and 01.001:X, ":T" != ":X"
5	FieldID is not unique and is also used for FieldRef '{0}'	FieldID	FieldIDs must be unique in a table.
6	Row does not have FieldNum or XMLPath defined	FieldID	If the FieldID does not have a field number, it is an XML only field and should then have an XMLPath defined.
7	InfoItem must be blank if FieldNum is blank	InfoItem	
8	InfoItem does not match info item specifier in FieldID column	InfoItem	Example: InfoItem is "B" but FieldID is "01.003-A", "A" != "B"
9	InfoItemCount must match the number of info items when InfoItem is 'SET'	InfoItemCount	
10	If a CondCode contains a caret, it can only be used for info items.	CondCode	
11	If there exists a value in InfoItem, there must be a value in DataType unless the InfoItem = 'SET' or ContentType = 'Set', 'Set_X', or 'Set_T'	DataType	
12	If there exists a value in InfoItem, there must be a value in MinLength unless the InfoItem = 'SET' or ContentType = 'Set', 'Set_X', or 'Set_T'	MinLength	
13	If there exists a value in InfoItem, there must be a value in MaxLength unless the InfoItem = 'SET' or ContentType = 'Set', 'Set_X', or 'Set_T'	MaxLength	
14	Mnemonics are required for traditional field rows	Mnemonic	
15	Traditional mnemonics must be unique for field rows within a record. '{0}' is already defined for row '{1}'.	Mnemonic	

Error Code	Format String	Column(s)	Description
16	Traditional mnemonics must be unique for info item rows within a field. '{0}' is already defined for row '{1}'.	Mnemonic	
17	SpecialChar should only include 'special characters' i.e. printable characters that aren't letters or numbers (ascill codes 33 thru 126)	SpecialChar	
18	SpecialChar or NonPrintChar required when DataType has an 'S'	SpecialChar, NonPrintChar	
19	SpecialChar and NonPrintChar should be omitted if DataType has no 'S'	SpecialChar, NonPrintChar	
20	XMLPath required for XML fields (TradXML = X or TX)	XMLPath	
21	XMLPath should be omitted for traditional fields (TradXML = T)	XMLPath	
22	XML path '{0}' does not exist in a transaction file	XMLPath	This is checked using data generated from the official xml schemas for a particular application profile.
23	XML path '{0}' does not have a 'set' content type and should be a leaf node	XMLPath	
24	Code Table '{0}' does not exist	CodeTable, XMLPath	
25	CodeTableOpt should be omitted if there are no Code Tables specified	CodeTableOpt	
26	Regular expression compilation error: {0}	RegExpression	
27	If there exists an InfoItem that is not equal to 'SET', then there should be a CondCode	CondCode	
28	If CondCode does not have a caret there should not be an InfoItem or it should be 'SET'	CondCode	
29	Primary description should be set to true for one occurrence of code '{0}' in code table '{1}'	PrimaryDescription	
30	Code '{0}' occurs more than twice in code table '{1}'	Code	
31	TOT '{0}' does not exist in the FBIEBTS:TOT code table	TOT	
32	Record.field combination '{0}.{1}' does not exist in the field definition table	RecordNum, FieldNum	
33	Mnemonic '{0}' does not match the mnemonic for record.field combination '{1}.{2}' in the field definition table	Mnemonic	
34	For fields where CondCode = D, there needs to be a value in one of these fields: DependPresenceReq, DependPresenceOpt, DependAbsence, DependValue,	CondCode	

Error Code	Format String	Column(s)	Description
	DependValueReq, DependValueOpt, DependOther, or the Exception column must be true.		
35	For fields where CondCode = O or O^, MinOccur shall be 0	CondCode	
36	For fields where CondCode = M or M^, MinOccur shall be greater than or equal to 1	CondCode	
37	If FieldID is present, Description is required	Description	
38	Record number '{0}' specified in column '{1}' does not exist in the Field Definition Table	TOTRecords columns with the format T\d+_((Min)|(Max))	
39	Summary field is required for traditional fields, optional for XML fields	Summary	
40	The string '{0}' has invalid syntax	XMLPath, ValueRange, DependValue, DependValueReq, DependValueOpt, InterFieldValue	
41	The minimum must be less than or equal to the maximum in range {0}..{1}	XMLPath, ValueRange, DependValue, DependValueReq, DependValueOpt	
42	FieldRef '{0}' does not exist	Any column that uses FieldRefs	
43	Only {0} field reference(s) are allowed for this column, found {1}	InterFieldCount	
44	Referenced field '{0}' cannot have InterFieldCount defined	InterFieldCount	
45	Referenced field '{0}' must be limited to a single occurrence	InterFieldCount	
46	If DependOther or InterFieldOther is set to true, TechNotes must be populated	TechNotes	
47	Parser error at location ({0}), near '{1}': {2}	XMLPath, ValueRange, DependValue, DependValueReq, DependValueOpt, InterFieldValue	

Error Code	Format String	Column(s)	Description
48	Value '{0}' must be less than '{1}' in double comparison.	DependValue, DependValueReq, DependValueOpy	
49	Value '{0}' must be greater than '{1}' in double comparison.	DependValue, DependValueReq, DependValueOpy	
50	Value '{0}' must be less than or equal to '{1}' in double comparison.	DependValue, DependValueReq, DependValueOpy	
51	Value '{0}' must be greater than or equal to '{1}' in double comparison.	DependValue, DependValueReq, DependValueOpy	
52	Field reference '{0}' has an invalid format	FieldRef	
53	FieldID '{0}' has an invalid format	FieldID	
54	XML path '{0}' is repeated. Also used for field '{1}'.	XMLPath	
55	Record type {0} does not exist in the Field Definition Table.	RecordType	