

ANSI/NIST-ITL 1-2007

**Data Format for the Interchange
of Fingerprint, Facial,
& Other Biometric Information**

XML Workgroup

Gerry Coleman, chair

coleman@doj.state.wi.us

**Recommendations to the
NIST Workshop
September 18, 2007
Gaithersburg, MD**

Objectives

A complete XML representation of the 1-2007 specification.

Field/subfield mapping of Part 1 to Part2 XML elements.

Preserve backward compatibility.

Conform to NIEM extension rules.

Use, where possible, NIEM 2.0 objects.

Define a NIST-ITL namespace.

Conform to NIEM IEPD requirements.

Recommend additions and repair content in the ANSI-NIST namespace of NIEM.

Part 1 and 2 Differences

- No Logical Record Length
- No field identifiers or mnemonics
- Different element ordering
- There are no binary records or content
- Images are expressed in Base-64 coding

Part 1 and 2 Similarities

- Every record is represented, in the same order
- Part 1 fields map to Part 2 element(s)
 - Except Logical Record Length
 - Some repeat: (09.008 CRP) <MinutiaeFingerCorePosition>
 - Some are split: (01.002 VER)
 - <TransactionMajorVersionValue>
 - <TransactionMinorVersionValue>
- Package content is summarized in the first record
- Each record carries an image ID pointer

XML Workgroup chair:
NIST contacts:

Gerry Coleman coleman@doj.state.wi.us
Mike McCabe mccabe@nist.gov, Elaine Newton enewton@nist.gov

Ralph Lessmann r.lessmann@shb-jena.com
Dave Weston david.weston@identix.com
Kirsten Nobel kirsten.nobel@identix.com
David Woo david.woo@doj.ca.gov
Alessandro Triglia sandro@oss.com
Rob Mungovan rob@aware.com
David Rodman david.rodman@usdoj.gov
Bonny Scheier winstats@pacbell.net
Owen Greenspan owen.greenspan@search.org
Alan Viars alan.viars@dodbfca.army.mil
Greg Cannon greg.cannon@crossmatch.com
Cherie Morgan cherie.d.morgan@lmco.com
Dale Hapeman dale.hapeman@dodbfca.army.mil
Mike Garriss mgarriss@nist.gov
Ross Michaels rossm@nist.gov
Scott Hills hills@aware.com
Cathy Plummer cplummer@nlets.org
Kate Silhol ksilhol@nlets.org
Axel Goerlich a.goerlich@shb-jena.com
Mike Webb michael.webb@lmco.com
Patrice Yuh PYuh@leo.gov
Tom Hopper thopper@leo.gov
B Scott Swann bswann@leo.gov
Linda King Baroni baronil@ma.rr.com
Darrell Geusz darrell.geusz@bio-key.com
Edmon Begolie begolie@y12.doe.gov
Paul Embly pembly@ghinternational.com
Mike Lesko Mike.Lesko@txdps.state.tx.us T
Michael Simcock msimcock@systemsresources.net
Daven Williams dwilliams@iosoftware.com

NIEM technical contacts:

Mark Kindl mark.kindl@gtri.gatech.edu
John Wandelt john.wandelt@gtri.gatech.edu
Christina Medlin christina.medlin@gtri.gatech.edu

Smith Heimann Biometrics
Identix
Identix
CA Dept of Justice
OSS Nokalva
Aware
PEC
Saber
SEARCH
Defense Biometrics Fusion Center
Crossmatch
BAE Systems Info Technology
Biometrics Fusion Center
NIST
NIST
Aware
Nlets
Nlets
Smith Heimann Biometrics
Biometrics Fusion Center
FBI/CJIS
FBI/CJIS
FBI/CJIS
SAIC
BIO-key International
E3D
Natl Center for State Courts
Texas Dept of Public Safety
US-VISIT
I/O Software

Participants

Website: <http://www.doj.state.wi.us/les/NIST-ITL>
NIST-ITL XML Workgroup

On the project website:

Example XML Instance Document

NIST-ITL Schema

NIEM Schema

(temporary modified ANSI-NIST.xsd file)

Spreadsheet element chart (outline format)

Spreadsheet element chart (mapping to Part 1

(to be done) Text documentation

(to be done?) Stylesheet

<http://www.doj.state.wi.us/les/NIST-ITL>

NIEM “ansi-nist:” content requiring correction

- <MinutiaQualityValue>
<MinutiaCategoryCode>
<MinutiaRidgeCount>
 move from “MinutiaeNISTStandardType”
 to “MinutiaDetailType”
- GCACodeSimpleType
 has only numeric enumerations; needs *text*
 abbreviations, like JPEG. E.g., see 10.011 CGA.
- <PatternCodeSourceCode> is typed as a Pattern type
 like “PW”, but should be “T” or “U”

NIEM “ansi-nist:” content requiring extension

To “FingerprintImageType” add

<FingerprintFingerMissing>

<FingerprintImageNISTQuality>

<FingerprintImageSegmentPositionPolygon>

<FingerprintImageSegmentPositionSquare>

To “IrisImageType” add

<IrisDiameterPixelQuantity>

Add “RecordImage” substitution group to
“NISTImageType”

Namespaces

- External
 - xsd: W3C XML
- NIEM
 - i: Information/Documentation
 - s: Structures
 - nc: NIEM Core
 - ansi-nist: Domain-specific schema
- ANSI/NIST-ITL 1-2007
 - itl:

NISTBiometricInformationExchangePackage

PackageInformationRecord

Type 01

RecordCategoryCode
Transaction

PackageDescriptiveTextRecord

Type 02

RecordCategoryCode
ImageReferenceIdentification
UserDefinedDescriptiveText

PackageDataRecord (abstract)

Types 03 - 99

RecordCategoryCode
ImageReferenceIdentification
UserDefinedFields
(extended content)

itl:PackageImageRecord

(Types 03,04,05,06,07,08,10,13,14,15,16,17,99)

ansi-nist:RecordCategoryCode

ansi-nist:ImageReferenceIdentification

itl:UserDefinedFields

ansi-nist:RecordImage (abstract)

itl:FingerprintImage	14
itl:IrisImage	17
itl:UserDefinedImage	07
itl:TestImage	16
ansi-nist:FingerprintImage	03,04,05,06,13
ansi-nist:FacelImage	10
ansi-nist:PalmpImage	15
ansi-nist:PhysicalFeatureImage	10
ansi-nist:SignatureImage	08
ansi-nist:CBEFFImage	99

itl:PackageMinutiaeRecord (Type 09)

ansi-nist:Minutiae	09
--------------------	----

NIST-ITL Biometric Information Exchange Package

PackageInformationRecord

Type 01

RecordCategoryCode

Transaction

TransactionDate

TransactionDestinationOrganization

TransactionOriginatingOrganization

TransactionUTCDate

TransactionControlIdentification

TransactionReferenceIdentification

TransactionDomain

TransactionImageResolutionDetails

TransactionMajorVersionValue

TransactionMinorVersionValue

TransactionPriorityValue

TransactionCategoryCode

TransactionContentSummary

TransactionCharacterSetDirectory

NIST-ITL Biometric Information Exchange Package

PackageDescriptiveTextRecord

Type 02

RecordCategoryCode

ImageReferenceIdentification

UserDefinedDescriptiveText

DomainDefinedDescriptiveText

OtherDescriptiveText

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Types 03, 04, 05, 06, 13

RecordCategoryCode

ImageReferenceIdentification

FingerprintImage

nc:Binary

nc:Image

ansi-nist:NISTImage

ansi-nist:FingerprintImage

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Type 07

RecordCategoryCode

ImageReferenceIdentification

UserDefinedImage

itl:UserDefinedFields(type)

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Type 08

RecordCategoryCode
ImageReferenceIdentification
SignatureImage
 nc:Binary
 nc:Image
 ansi-nist:NISTImage
 ansi-nist:SignatureImage

NIST-ITL Biometric Information Exchange Package

PackageMinutiaeRecord

Type 09

RecordCategoryCode
ImageReferenceIdentification
ansi-nist:Minutiae

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Type 10

RecordCategoryCode
ImageReferenceIdentification
FacelImage
 nc:Binary
 nc:Image
 ansi-nist:NISTImage
 ansi-nist:FacelImage

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Type 10

RecordCategoryCode

ImageReferenceIdentification

PhysicalFeatureImage

nc:Binary

nc:Image

ansi-nist:NISTImage

ansi-nist:PhysicalFeatureImage

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Type 14

RecordCategoryCode

ImageReferenceIdentification

FingerprintImage

nc:BinaryObject

nc:Image

ansi-nist:NISTImage

ansi-nist:FingerprintImage

itl:FingerprintImage

FingerprintImageFingerMissing

FingerprintImageNISTQuality

FingerprintImageSegmentPositionPolygon

FingerprintImageSegmentPositionSquare

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Type 15

- RecordCategoryCode
- ImageReferenceIdentification
- PalmprintImage
 - nc:Binary
 - nc:Image
 - ansi-nist:NISTImage
 - ansi-nist:PalmprintImage

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Type 16

RecordCategoryCode
ImageReferenceIdentification
TestImage
 nc:Binary
 nc:Image
 ansi-nist:NISTImage
 itl:TestImage

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Type 17

RecordCategoryCode

ImageReferenceIdentification

IrisImage

nc:Binary

nc:Image

ansi-nist:NISTImage

ansi-nist:IrisImage

Itl:IrisImage

IrisDiameterPixelQuantity

NIST-ITL Biometric Information Exchange Package

PackageImageRecord

Type 99

RecordCategoryCode
ImageReferenceIdentification
CBEFFImage
 nc:Binary
 nc:Image
 ansi-nist:NISTImage
 ansi-nist:CBEFFImage

PackageCBEFFRecord

The word "Better?" is rendered in a 3D, blocky font with a green-to-white gradient and a grid-like texture. The letters are slightly offset from each other, giving it a sense of depth and movement.

RecordCategoryCode
ImageReferenceIdentification
CBEFFData
 nc:Binary
 CBEFFData

Element Chart

14.001	LEN	Not implemented
14.002	IDC	<ansi-nist:ImageReferenceIdentification>
14.003	IMP	<ansi-nist:FingerprintImageImpressionCaptureCategoryCode>
14.004	SRC	<ansi-nist:CaptureOrganization>
14.005	FCD	<ansi-nist:CaptureDate>
14.006	HLL	<ansi-nist:ImageHorizontalLineLengthPixelQuantity>
14.007	VLL	<ansi-nist:ImageVerticalLineLengthPixelQuantity>
14.008	SLC	<ansi-nist:ImageScaleUnitsCode>
14.009	HPS	<ansi-nist:ImageHorizontalPixelDensityValue>
14.010	VPS	<ansi-nist:ImageVerticalPixelDensityValue>
14.011	CGA	<ansi-nist:ImageCompressionAlgorithmCode>
14.012	BPX	<ansi-nist:ImageBitsPerPixelQuantity>
14.013	FGP	<ansi-nist:FingerprintImagePosition>
14.014	PPD	<ansi-nist:FingerPositionCode>
14.015	PPC	<ansi-nist:MajorCasePrintSegmentOffset>
14.016	SHPS	<ansi-nist:CaptureHorizontalPixelDensityValue>
14.017	SVPS	<ansi-nist:CaptureVerticalPixelDensityValue>
14.018	AMP	<itl:FingerprintImageFingerMissing>
14.020	COM	<ansi-nist:ImageCommentText>
14.021	SEG	<itl:FingerprintImageSegmentPositionSquare>
14.022	NQM	<ansi-nist:FingerprintImageNISTQuality>
14.023	SQM	<ansi-nist:FingerprintImageSegmentationQuality>
14.024	FQM	<ansi-nist:ImageQuality>
14.025	ASEG	<itl:FingerprintImageSegmentPositionPolygon>
14.030	DMM	<ansi-nist:CaptureDeviceMonitoringModeCode>
14.200-998	UDF	<itl:UserDefinedFields>
14.999	DATA	<nc:BinaryBase64Object>

Backwards Compatibility?

Record Mapping
Field Mapping
Data Values
Code Tables
Base64 to Binary
Record size

Instance Document

```
<!-- ===== -->
<!-- RECORD TYPE 14 Variable Resolution Fingerprint Image (Single Finger) -->
<!-- ===== -->
<itl:PackageImageRecord>
  <ansi-nist:RecordCategoryCode>14</ansi-nist:RecordCategoryCode>
  <!-- ===== fieldID="14.002" fieldMnemonic="IDC" == -->
  <ansi-nist:ImageReferenceIdentification>
    <nc:IdentificationID>10</nc:IdentificationID>
  </ansi-nist:ImageReferenceIdentification>
  <!-- ===== fieldID="14.200-998" fieldMnemonic="UDF" == -->
  <itl:UserDefinedFields>
    <!-- Well-formed XML goes here -->
  </itl:UserDefinedFields>
  <itl:FingerprintImage>
    <!-- =====fieldID="14.999" fieldMnemonic="DATA" == -->
    <nc:BinaryBase64Object>mrHbPdrko3u1s7ahtgPBjtmO1s85tfG2U7bpofY9
      4Czu2SbY7d7wF9fQ7ZptgGrtkO2a2dsJ7wZbe 8BlzvAmQ7xq+Y94GoHeEsR3ikWd4DIGhzmp3k42
      d4DRmzs94DKveDTB3hqw6PeBLrtpPep0H/+h</nc:BinaryBase64Object>
    <!-- =====fieldID="14.012" fieldMnemonic="BPX" == -->
    <ansi-nist:ImageBitsPerPixelQuantity>8</ansi-nist:ImageBitsPerPixelQuantity>
    <ansi-nist:ImageCaptureDetail>
      <!-- =====fieldID="14.005" fieldMnemonic="FCD" == -->
      <ansi-nist:CaptureDate>
        <nc:Date>1953-04-23</nc:Date>
      </ansi-nist:CaptureDate>
      <!-- =====fieldID="14.016" fieldMnemonic="SHPS" == -->
      <ansi-nist:CaptureHorizontalPixelDensityValue>500</ansi-nist:CaptureHorizontalPixelDensityValue>
    </ansi-nist:ImageCaptureDetail>
  </itl:FingerprintImage>
</itl:PackageImageRecord>
```

9.1.6 Element <TransactionPriorityValue>

When this element is used, it shall contain a single information character to designate the urgency with which a response is desired. The values shall range from "1" to "9", with "1" denoting the highest priority. The default value shall be defined by the agency receiving the transaction.

The comment line displaying FieldID and mnemonic is optional.

Example:

```
<!-- FieldID 1.006 Priority (PRY) --!>  
<ansi-nist:TransactionPriorityValue>6  
  </ansi-nist:TransactionPriorityValue>
```

Text Documentation

Publication Recommendations

Publish PART 2 of Specification

XML documentation, text version

normative

Publish as Annexes:

Example XML Instance Document

informative

ANSI/NIST-ITL Package Schema

normative

NIEM subset schema

normative

Spreadsheet element chart

informative

NIST-ITL XML Workgroup Recommendations

1. Adopt this XML proposal as a “PART 2” alternative version of ANSI/NIST-ITL 1-2007.
2. Endorse error corrections and extensions to the “ansi-nist:” domain within NIEM.
3. Register at OJP’s IEPD Clearinghouse (<http://it.ojp.gov/iepd/>).