ANSI/NIST Fingerprint Standard Update

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What is it?

- ANSI/NIST-ITL 1-2000 Standard Data Format for the Interchange of Fingerprint, Facial, & Scar Mark & Tattoo (SMT) Information
- Standard describing the Fingerprint Data Interchange Format Used by Law Enforcement agencies
  - FBI
  - DHS
  - State & local Police Agencies
- De facto ISO Standard
  - Canada, UK, Germany
  - Eurodac, Interpol
- Format similar to commercial M1 standards
Structure of Standard

- Sixteen record types - ASCII, binary, or combination
- Used for exchanging information describing:
  - Transaction itself
  - Descriptive, demographic, and rap sheet information
  - Finger and palm print image and minutiae information
  - Facial image
  - Scar mark and tattoo image and descriptive information
  - User defined type record.
## History of ANSI/NIST Fingerprint Standard

<table>
<thead>
<tr>
<th>Standard Type</th>
<th>Year</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANSI/NBS-ICST 1-1986</td>
<td>Minutiae-Based</td>
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<td>ANSI/NIST-CSL 1-1993</td>
<td>Image-Based 8-bit</td>
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<td>gray levels 500 ppi</td>
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<td>WSQ/15:1</td>
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<td>ANSI/NIST-ITL 1a-1997</td>
<td>Facial &amp; SMT</td>
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<tr>
<td>ANSI/NIST-ITL 1-2000</td>
<td>Tagged-field records</td>
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<td>higher resolution</td>
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<td>palms &amp; latents</td>
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<tr>
<td>ANSI/NIST-ITL 1-200X</td>
<td>?</td>
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Revision of 1-2000 Standard

- Open workshop held April 26-28, 2005 (NIST)
- ANSI requirement for a 5-year review
- Overview of major implementations
- New initiatives from the FBI/CJIS
- Talks on PIV and Quality indicators presented
- Review of current ANSI/NIST-ITL 1-2000 standard
- Identify aspects of the standard for update
- Introduce new features for possible inclusion
Both address finger image, finger minutiae, and face data (M1 provision for Iris data)

- M1: encodes data using a format consisting of fixed binary fields - not easily expandable.
- ANSI/NIST: tagged fields containing both ASCII and binary data - expandable format
- ANSI/NIST: vendor-specific minutiae fields
- M1: Contains additional information fields in the finger image, minutiae, and face formats
- M1: requires use of CBEFF
ANSI/NIST - INCITS/M1
Harmonization

- WHY? Provide systems the option of processing and converting information between ANSI/NIST and M1 data formats.
  - Reserve an additional block of vendor-specific fields for M1-type fingerprint minutiae data
  - Define finger and palm image fields to specify image capture parameters, optional product identification, and image quality information
  - Define a new record type for iris image data
  - Define additional face information fields to contain visible facial features.
CBEFF Considerations

- CBEFF structure requires a header record to precede the data block.
- Would change the structure of the ANSI/NIST format - not well received.

**Alternatives**

- For existing record types define five additional fields to satisfy the minimum requirements of a CBEFF header record.
- For biometric data types not addressed by ANSI/NIST define a new record type to include required ANSI/NIST and CBEFF information fields.
XML Representations

- Four different approaches proposed

**Favored Approach**

- Develop a representation of the existing standard
- Map as closely as possible the existing records and numeric tags to XML tags
- Tag names to be descriptive of the element content
- Use the language of the text of the current standard
XML Sample

- Create a tag name for the entire package
  `<ITL_Identification_Transmission_Package>`

- Create tag names for each logical record
  `<Tenprint_Fingerprint_Impressions>`

- Create tag names to replace all numeric tags
  (for 1.004) `<TypeOfTransaction>`

- Recommend Base64 Encoding for embedded binary data.
Latent Fingerprint Issues

- Develop an approach to encode first- and third-level details which may include:
  - pores
  - ridge widths
  - ridge relationships
  - ridge edge shapes
  - dots
  - ridge flow

- Require a minimum scanning resolution of 1000 ppi for the capture of latent images

- Develop codes and descriptions for major case prints

- Update Finger Impression Type table (swipe, etc.)
Face Image Proposals

- Allow color JPEG 2000 for compression to improve image quality
- Add provision for quality score and algorithm identification information
- Define fields for 3D pose angle (yaw, pitch, & roll)
- Include a facial image capture profile that addresses compression limits, capture requirements, and other best practice attributes or requirements.
Miscellaneous Issues

- Consider UTF-8 in place of 7-bit ASCII for user-defined fields to simplify international uses
- Formally specify codes for WSQ, JPEG, etc.
- Develop a GPS field for a mapping of location
- Develop a Submission Tracking Field to support traversing of vendors and jurisdictions
- Adjust length and width dimensions to accommodate enlarged platen sizes for plain images on newer live-scan devices
Conclusions of 1st Workshop

- No authorized voting body established
- Modification and new features were presented but more definition of each item was needed
- A consensus of all present was that the standard should be updated and revised
- Further refinement of updates and enhancements was needed before inclusion in the standard
- Form 8 ad hoc groups to formalize update proposals
- Develop & circulate summary of the 1st workshop
- A second workshop should be convened
Development of the Revision to the Standard

- Schedule a 2nd workshop (December 5-6, 2005)
- Develop a Canvass List
- Convene 2nd workshop (December 5-6, 2005)
- Present findings of each ad hoc group
- Vote on each proposal for inclusion in standard
- Develop draft update: ANSI/NIST 1-200X
- Circulate for comment
- Edit draft
- Circulate for vote (30 day minimum)
- Submit to ANSI if approved; else update and
Standards Approval Considerations

- Consensus on a proposed standard by a group that includes representatives from materially affected and interested parties;
- Broad-based public review on draft standards;
- Consideration and response to comments from voting members of the consensus body;
- Incorporation of approved changes into a draft standard; and
- Right to appeal by any participant that believes that due process principles were not sufficiently respected during the standards development in accordance with the ANSI-accredited procedures.
More Information

Fingerprint.nist.gov/standard

- Current and future drafts of standard
- Presentations made & summary of April 2005 workshop (NISTIR 7242)
- Method used to develop revision
- How to participate and become a canvasser
- Results of ad hoc groups
- Information and registration for 2nd workshop