

User:

# Biometrics and the PIV Card

C. L. Wilson and Patrick Grother

Image Group

IAD-ITL

# What are HSPD-12, PIV Cards, FIPS 201, SP 800-76 and SP 800-73?

- HSPD-12 - Homeland Security Presidential Directive 12, August 27, 2004
- PIV - is the card required government wide to provide Personnel Identification Verification for all agencies as required by HSPD-12
- FIPS 201 is the standard for PIV cards and processes
- SP 800-76 is the NIST document containing the biometric specifications for FIPS 201
- SP 800-73 is the NIST document containing the interface specifications for FIPS 201

# Basic Functions for PIV Cards

- Registration
  - FBI background check
  - Uses existing FBI EFTS transactions
- Card to User
  - Biometric verification at issuance
  - Both mandatory and optional biometrics
- Verification
  - Logical and physical access
  - Match biometric to card
  - Match to database with card as token

# FIPS-201, SP 800-76

- All biometric specifications from FIPS-201 have been moved to NIST Special Pub. 800-76.
- Two fingerprints are mandatory on the card.
- Enrollment is with a face and ten segmented slaps.
- Existing FBI transactions are used for enrollment, but data is not required to be retained by the issuer.
- Card fingerprints are stored in an M1 format with CBEFF wrapper.
- FIPS 201 was published February 25, 2005.

## Biometric Data on PIV Card

<b>Type of Data</b>	<b>When Captured/ Location</b>	<b>Purpose</b>
Ten slap (flat) fingerprints	PIV Registration	Law Enforcement Check
The two Index fingerprints	Card Personalization	Automated Identity Verification
Facial Image	Card Personalization	Manual Identity Verification

## Data Quality Requirements – Ten Fingerprints

<b>Characteristic</b>	<b>Standard/Metric</b>
Four Left-Hand Fingers Four Right-Hand Fingers Two Thumbs	Codes 13,14 & 15 of ANSI/NIST ITL-1-2000, CJIS-RS-0010, EFTS/F
Resolution	500 ppi
Pixel Depth	256 Grayscale levels(8bits)
Compression Algorithm	WSQ
Specification of Image Quality	NFIQ Level (NISTIR 7151)

# Data Quality Requirements –Two Index Fingers

Characteristic	Standard/Metric
Two Index Fingers	Two instances of INCITS 381-2004
Interchange Format	CBEFF INCITS 398-2005
Resolution	500 ppi
Pixel Depth	256 Grayscale levels (8 bits)
Compression Algorithm	WSQ

## Data Quality Requirements –Facial Image

<b>Characteristic</b>	<b>Standard/Metric</b>
Full-frontal Image	INCITS 385-2004
Encoding	sRGB
Image Width/Height	420 by 560 pixels
Inner Region Width/Height	> 336 by 420 pixels
Resolution	Eye-to-eye 72 pixels
Compression Algorithm	Baseline JPEG or JPEG 2000 Max CR: 24:1

# How Were These Recommendations Decided?

- Both the Patriot Act and HSPD-12 schedules require COTS solutions.
- Competitive multi-vendor solutions are needed.
- The biometric components must be part of an integrated interoperable system.
- NIST must test these components to a Daubert (expert witness) standard.

# Why Face and Fingerprints?

- ICAO specified face, fingerprints, and iris.
- Large operational quality samples of face and fingerprint data are available for test.
- No equivalent sample of vendor-neutral iris data exists.
- Face and fingerprints can operate with 0.1% Failure to Acquire rates. This rate is unknown for iris.

# Image Size Issues

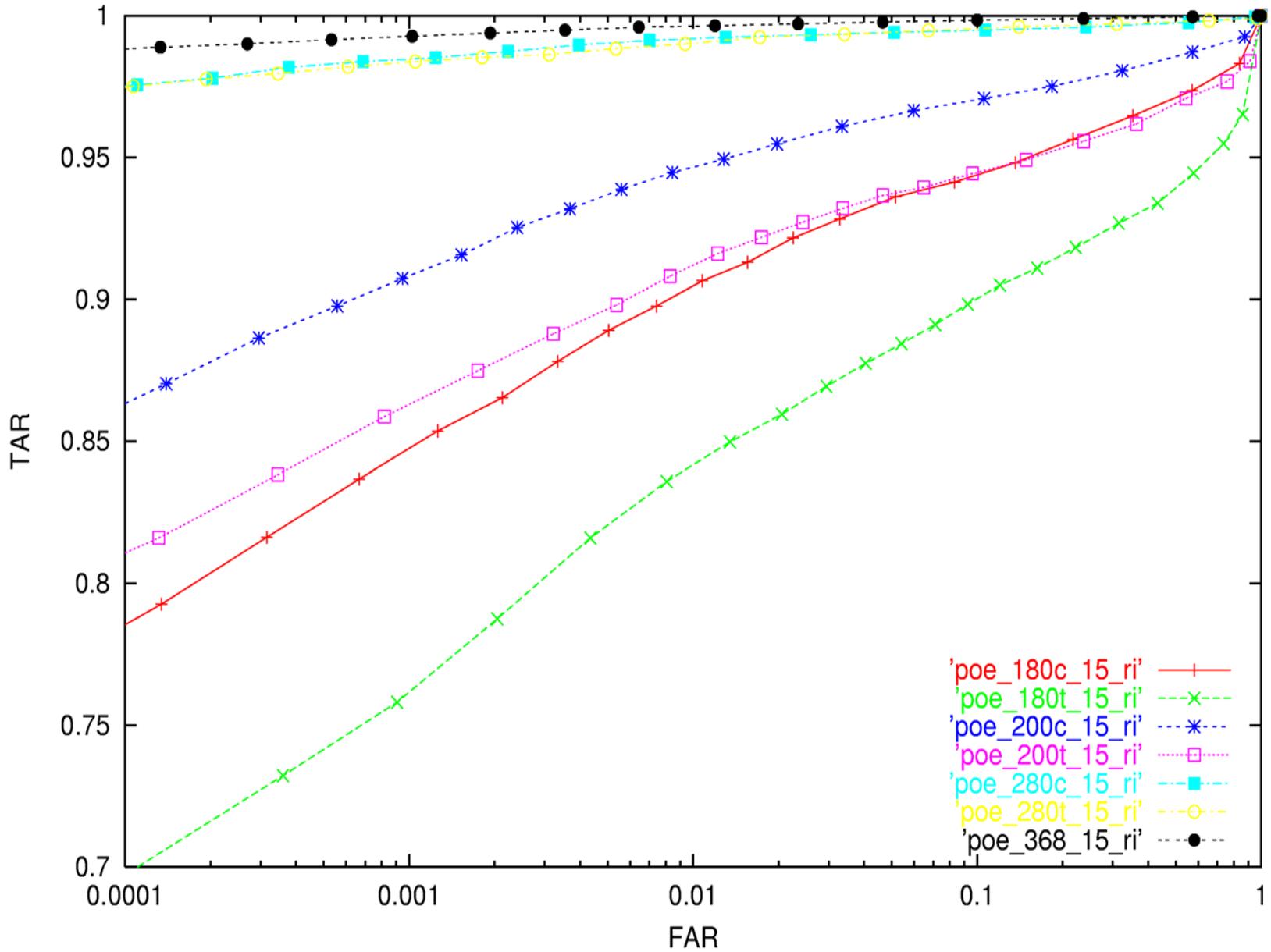
- Image on the cards.
  - Available space is less than 20K
  - Both image size and compression are being tested to get the two fingerprints down to 15K or less
- Face is not required on the card.
- Biometric data is passed across card's mandatory contact interface.

# Minimum 1:1 Fingerprint Image Size

- Image sizes from 368 by 368 down to 180 by 180 were tested and compression ratios from no compression up to 30 to 1 were tested.
- Image sizes below 320 by 320 should not be used. Image compression in the range up 20 to 1 produces minimal effects on fingerprint matching accuracy.



ROC F: POE 15:1- Right Index P2P



# Image Size Effect on TAR at FAR of 0.001 for 368 DOS-C data

<b>Image Size</b>	<b>Right finger</b>	<b>Left finger</b>
<b>368</b>	0.986	0.969
<b>320</b>	0.981	0.959
<b>280</b>	0.971	0.944
<b>200</b>	0.839	0.764
<b>180</b>	0.762	0.688

# Compression Effect on TAR at FAR of 0.001 for 320 POE data

<b>Compression Ratio</b>	<b>Right finger</b>	<b>Left finger</b>
<b>15</b>	0.990	0.982
<b>20</b>	0.983	0.972
<b>25</b>	0.978	0.970