

Enter Once, Search Many for AFIS/ABIS – is it getting closer?

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Tuscany 10

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Introduction

Automated Fingerprint Identification Systems (AFIS) allow latent print examiners to search fingerprint files and to transmit fingerprint images.

However, examiners often lack the ability to access AFIS in **neighboring jurisdictions.**

In addition, before submitting a print for an AFIS search, examiners must **manually annotate the print's features in a way that the system can understand.**

Unfortunately, this notation method is often different for various AFIS databases, requiring the examiner to **re-encode each print before searching each AFIS, losing valuable time.**

This **lack of latent print search interoperability and the subsequent **missed opportunities to make identifications** have been long recognized as serious issues within the examiner community.**

Source: Latent Print AFIS Interoperability Working Group website:

<https://www.nist.gov/programs-projects/latent-print-afis-interoperability-working-group>

Introduction

“Interoperability” is the ability of two or more networks, systems, devices, applications, or components to use **standardized encoding to seamlessly and electronically share information on demand** and as authorized, **without special effort** and without loss of accuracy. Interoperability of AFIS software would allow law enforcement agencies to **search fingerprint records beyond those within their own jurisdictions** in support of efforts to identify suspects and protect public safety.

Source: Achieving Interoperability For Latent Fingerprint Identification In The United States, April 2015, © Committee on Science Subcommittee on Forensic Science OF THE NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

Introduction – Status Quo

Since the introduction of... the Federal Bureau of Investigation's Integrated Automated Fingerprint Identification System (IAFIS) in the late 1990s, some criminal justice agencies have had the ability to search latent prints not only against their own fingerprint database but also against a hierarchy of local, state, and federal databases. This **hierarchical search** is referred to as a vertical search process.

Source: Latent Print AFIS Interoperability Working Group website:

<https://www.nist.gov/programs-projects/latent-print-afis-interoperability-working-group>

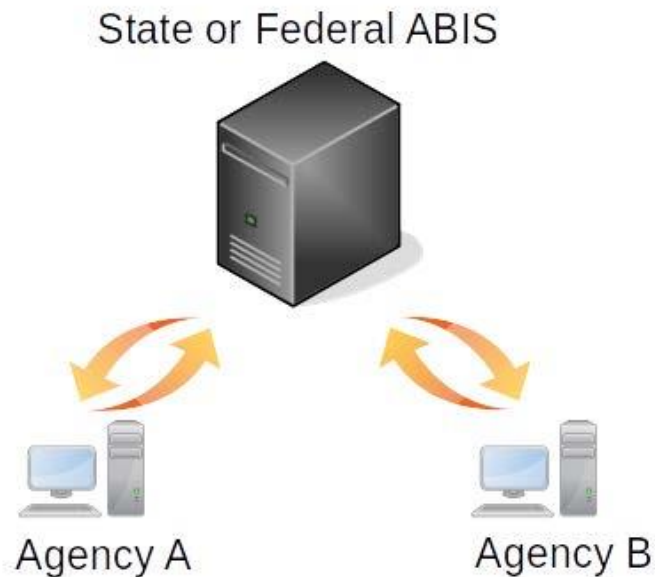
Introduction – Status Quo

Most ABIS systems in the U.S. take advantage of hierarchical record-sharing networks, where fingerprint records flow up from city, county, and state agencies, ultimately to the FBI Next Generation Identification (NGI) system. However, some jurisdictions do not participate in this hierarchical system, while others who do participate do not submit all their fingerprint records, resulting in some states and localities having records not found in NGI. Systems at the state level and below, for the most part, cannot perform searches in neighboring jurisdictions, potentially allowing a subject of interest to go unidentified, risking public safety.

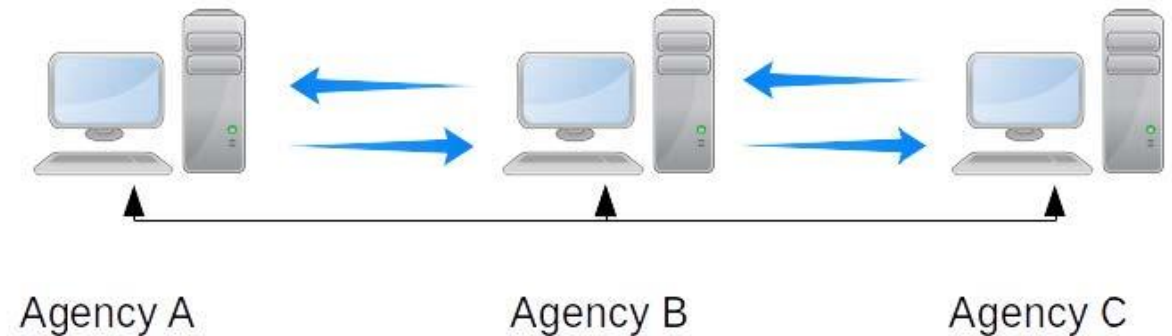
*Source: “Interoperability of ABIS—CFISO Position” Consortium of Forensic Science Organizations
June 2023*

Hierarchical Interoperability vs Cross-Jurisdictional Interoperability

Hierarchical Interoperability



Cross-Jurisdictional Interoperability



Source of images: Draft Report on ABIS Interoperability by French, Fiumara et al 2022



International Association
for Identification

Report on ABIS Interoperability

Prepared by the Biometric Information Services Subcommittee
For the 106th Educational Conference in Omaha, Nebraska
July 31–August 6, 2022

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Report on ABIS Interoperability

This report is available as a draft from Biometric Information Services on the IAI website:

https://theiai.org/biometric_information_services.php

Cross-Jurisdictional Interoperability

While hierarchical interoperability is functioning successfully in many but far from all agencies, cross-jurisdictional interoperability is rare due to technical and non-technical issues.

Since multiple AFIS vendors historically produced incompatible systems sold to different jurisdictions, proprietary technology formed barriers to cross-jurisdictional interoperability.

This early proliferation of AFIS that initially were not interoperable created a culture and set of practices which became cemented in systems that generally don't communicate across jurisdictions.

Non-technical issues generally involve agreements such as memoranda of understanding (MOUs) between agencies exchanging information, as well as achieving compliance from vendors that will develop the required interfaces and subsystems that use the data.

Cross-Jurisdictional Interoperability

The “Enter Once, Search Many” objective that is promoted by NIST’s Latent Print AFIS Interoperability Working Group is still a dream for most, if not all agencies.



Cross-Jurisdictional Interoperability

The technical barriers impeding biometric data exchange between AFIS systems can be overcome.

While they have yet to be widely implemented, the technology and standards required to prepare a single file for submission of a latent print for searching against multiple (any) AFIS/ABIS databases have existed for years and include:

- **EBTS ELECTRONIC BIOMETRIC TRANSMISSION SPECIFICATION Version 11.2**
- **EFS Extended Feature Set Profile Specification**
 - **NIST Special Publication 1134**
- **Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information**
 - **(ANSI/NIST-ITL 1-2011)**
- **LITS Latent Interoperability Transmission Specification**
 - **NIST Special Publication 1152**

Heirarchical Interoperability

Most ABIS interoperability across the United States has evolved as a hierarchical structure to maintain and share criminal history information across all 50 states and with the FBI.

This involves arrestees being fingerprinted at the city or county level, and those arrest records flowing up to the state level, and then up again to the FBI's NGI system.

NGI

The FBI developed the Next Generation Identification (NGI), the world's largest and most efficient electronic repository of biometric and criminal history information.

85 million criminal fingerprint records and 30 million palm print records.

Unsolved Latent File of over 1 million prints

All states can send known records to NGI.

NGI also includes multimodal biometric identifiers such as facial photos and iris scans which can be searched.

Hierarchical Interoperability

- **Each state is required to have access to an ABIS**
- **Latent print searches are available to agencies on the state AFIS, or local city or county level if a local AFIS is available.**
- **Every state in the USA has direct access to NGI through the CJIS WAN**
- **In 2017 CJIS discontinued direct connectivity to NGI for agencies at the city and county levels, requiring these agencies to perform searches through network gateways managed by state agencies.**

NGI and Interoperability

The primary transmission method of biometric submissions from the states to the NGI System, including latent prints, is electronically via the CJIS WAN (Criminal Justice Information Services Wide Area Network).

CJIS WAN provides a secure transport mechanism for encrypted biometric and criminal history record information.

CJIS WAN is configured by FBI personnel and secured through firewall mandates.

(Ref: Privacy Impact Assessment for the Next Generation Identification Latent Services)

NGI and Interoperability

Each state has access to NGI through CJIS.

A designated CJIS Systems Agency (CSA) in each state is responsible for managing the transmission of files to and from the NGI.

CJIS provides connectivity to each CSA, which then provides NGI connectivity to its downstream state, local, tribal law enforcement agencies.

Municipal or county level agencies may submit latent prints to the state AFIS (CSA) via their in-house AFIS if they have one or via remote state AFIS workstations.

Some states allow local agencies to prepare latent search files using the ULW and send these to the state CSA via a secure transmission process.

The latent search files are then submitted to NGI by the CSA in each state via the CJIS WAN.

What is the ULW?

The Universal Latent Workstation (ULW) is an interoperable and interactive software tool developed for latent print examiners.

With a single encoding, the software facilitates the ability to exchange latent friction ridge images involving various AFIS systems - including the NGL.

While the software itself does not establish connectivity, it translates a latent image into a neutrally compatible digital format for AFIS search purposes.

The ULW software is provided at no cost to authorized criminal justice agencies.

To download:

<https://forms.fbi.gov/universal-latent-workstation-ulw-software-download-request>

What is the ULW?

Inquiries regarding the ULW Software and **access to the NGI System** are received by the Criminal Justice Information Services Division, Biometric Services Section, Investigative Services Support Unit, Latent Investigative Support Team at :

latentsupport@leo.gov
304-625-L8NT (5868)

Please note that ULW Software, by itself, does not establish connectivity/message routing to Automated Biometric Systems, either foreign or domestic. The ULW simply formats a latent print into an FBI EBTS compliant format for searching against many vendor systems.

<https://fbibiospecs.fbi.gov/biometric-modalities-1/latent>

NGI and Interoperability

Due to the speed and accuracy of the NGI latent print matching algorithms, some agencies now have a policy to search NGI first and then search at the state or local level second if the NGI search does not return a match.

FBI Latent Print Operations Unit studied the accuracy of the NGI and their workflow efficiency and found it was sufficiently accurate to allow them to reduce their latent AFIS search candidate list from 20 candidates down to 3 candidates.

Bottom line: NGI AFIS search is very accurate and sufficiently fast to be the first step in the latent AFIS search workflow for many agencies at the municipal, county and state levels.

Question Period

- **Who accesses NGI?**
- **Who accesses NGI through their in-house AFIS and the state?**
- **Who accesses NGI through ULW and the state?**
- **Who accesses NGI through a state workstation?**
- **Who can't access NGI?**
- **Who can access AFIS from neighboring or other regional agencies**

Interoperability – Focus on NGI?

What If:

- **All criminal tenprint and palm records were submitted to and stored in NGI?**
- **All agencies could search the NGI?**
- **All agencies could receive and process NGI search response files?**

It would certainly improve interoperability.

Interoperability – Focus on NGI?

Infrastructure is already available to provide the potential for all agencies to access NGI.

Focus effort on ensuring all agencies CAN access NGI and encourage them to submit criminal records.

Focusing on facilitating cross-jurisdictional interoperability has produced very limited results despite the issue being pinpointed as a problem for fifteen-plus years.

If all agencies can produce NGI compatible latent search files i.e LITS files, the same files can be submitted to any LITS compatible AFIS:

Enter Once, Search Many

Acronyms

- **LITS Latent Interoperability Transmission Specification**
 - **NIST Special Publication 1152**
- **LFFS = Latent Fingerprint Feature Search as per EBTS, EFS, LITS**
- **LFIS = Latent Fingerprint Image Search as per EBTS, EFS, LITS**
- **SRL = Search Response – Latent File as per EBTS, EFS, LITS**
- **EBTS ELECTRONIC BIOMETRIC TRANSMISSION SPECIFICATION
Version 11.2**
- **EFS Extended Feature Set Profile Specification**
 - **NIST Special Publication 1134**
- **Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information (ANSI/NIST-ITL 1-2011)**

Interoperability – Focus on NGI?

Potential issues:

- **If not all tenprint records are submitted to NGI, persons of interest may go unidentified.**
- **More close non-matches will appear in candidate lists due to NGI database size.**

NIST Special Publication 1155



Writing Guidelines for Requests for Proposals for Automated Fingerprint Identification Systems

Latent Print AFIS Interoperability
Working Group



Interoperability Guidelines

AFIS Vendors should implement data transmission format compatible with LITS:

- **Permit preparation of latent markup submission (LFFS) and image only submission (LFIS) files in standard format (LITS) that can be accepted by NGI and other AFIS i.e. ENTER ONCE SEARCH MANY**
- **Accept standard format (LITS) LFIS and LFFS transactions from other AFIS for latent searches**

Conformant latent print workstation software shall be capable of:

- **Importing LFFS searches conformant with LITS without loss of defined features**
- **Exporting LFFS latent feature searches conformant with LITS without loss of defined features.**

Extra Suggestions

- **Accept and display standard format SRL file search response results from any system – need to be able to compare latent image to candidate images**
- **Output search response results in standard format SRL file for display outside of AFIS workstations – avoid printing and rescanning hardcopies**

NGI Latent Search Workflow

What would the workflow look like?

- **Open latent image, assess suitability, calibrate, enhance, mark up**
- **Prepare compatible file - LITS/EBTS/EFS**
- **Send file to state CSA for submission to NGI (and state AFIS if desired)**
- **Receive search response from NGI (and state AFIS)**
- **Examine AFIS candidates and make comparison conclusions**
- **Prepare court charts and reports as necessary**
- **All of the above could be done on one computer**

Interoperability – Focus on NGI?

Example:

Latent Fingerprint Feature Search (LFFS) file preparation for submission to NGI.

Most of the fields that are input to the LFFS would be specified in cooperation with your state CJIS Systems Agency or CSA.

The software incorporates the mark up minutia, core and delta data into the LFFS file.

NGI Access Recap

- **Each state has access to NGI through CJIS.**
- **A designated CJIS Systems Agency (CSA) in each state is responsible for managing the transmission of files to and from the NGI.**
- **CJIS provides connectivity to each CSA, which then provides NGI connectivity to its downstream state, local, tribal law enforcement agencies.**

Inquiries regarding access to the NGI System are received by the Criminal Justice Information Services Division, Biometric Services Section, Investigative Services Support Unit, Latent Investigative Support Team at latentsupport@leo.gov or 304-625-L8NT (5868).

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QUESTIONS?

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