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Contactless Fingerprint Capture and Data Interchange Best Practice Recommendation

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Table of Contents

List of Tables

Executive Summary

In 2019 NIST orchestrated an investigation of contactless fingerprint capture technologies. This investigation examined devices from multiple vendors. This investigation commenced with a controlled data collection, and yielded findings documented in several studies including a thorough examination of the fundamental characteristics of friction ridge imagery collected by these devices [IR8307] and their impact on existing contact-based friction ridge matcher technologies [IR8307, IR8315]. While these contactless devices have the potential to provide many benefits, the images captured by these next generation contactless devices are fundamentally different than traditional contact-collected images [IR8307] signaling the need for caution when processing and storing these images in existing systems.

This Best Practices Recommendation (BPR) follows on the greater investigative effort undertaken by NIST and introduces an informative pathway for the integration of images captured by these contactless devices into existing systems. Furthermore, this informative BPR is being developed with the intention of eventual amendment to the ANSI/NIST standard to formalize it as a normative guidance once the community of interest determines the technology (including back-end components) has matured. This document does not directly specify the capabilities or performance of the local or central database or repository. Those requirements are driven by the particular problem being solved.

This BPR allows for the integration of these contactless devices into existing systems. At the same time addresses the need to keep images from these new contactless devices separate from legacy contact-collected images through elements defined in the biometric transaction. This BPR aims to achieve this by revising and extending the ANSI/NIST standard [ANST] such that:

1. Minor changes are made to the standards-based biometric data exchange so that contactless friction ridge data submissions are not readily ingestible by existing systems.
2. The changes presented in this guidance preserve backward compatibility of other records in the biometric data exchange.
3. This guidance includes provisions for optionally keeping the original capture sensor data, in addition to contact-compatible contactless images, in the event that vendors improve their algorithms allowing for the reprocessing of sensor data at a later date to improve interoperable images without recapture, or possible forensic applications.

While this BPR lays out a path for the incorporation of contactless fingerprint images into existing systems, a certification process for the forensic quality and usability of these contactless images (such as FBI's Appendix F Certification [APF]) is not yet in place. Acceptance of this informative BPR shall not be construed as the acceptance of contactless imagery by other stakeholders unless explicitly agreed to by all parties involved in the processing pathway. Caution is advised in incorporating this technology as it can negatively impact both the accuracy and throughput of existing systems [IR8315].

Abstract

While contactless fingerprint capture devices stand to provide for many benefits, images from this nascent technology are sufficiently different than traditional contact-collected images thereby warranting the separation of these new contactless fingerprint images from legacy contact-collected images and systems operating on them. This Best Practices Recommendation defines voluntary (informative) changes to the ANSI/NIST standard to allow for the creation of contactless transactions that are not readily ingestible by existing systems, but based closely on ANSI/NIST so that minimal changes to the system can allow for processing. Furthermore, the transactions can include the original sensor data, in addition to the contact-compatible/interoperable image in the event that vendors improve their technologies and allow for the reprocessing of the data without recapturing.

Keywords

Contactless fingerprints; Touchless fingerprints; Biometrics; Standards;

1. Introduction

In 2019 NIST orchestrated an investigation of contactless fingerprint capture technologies. This investigation included devices from multiple vendors using both mobile and stationary configurations[1]. This investigation commenced with a data collection effort using these devices under controlled conditions. The investigation yielded findings documented in several studies including a thorough examination of fundamental characteristics of friction ridge imagery as collected by these devices [NISTIR 8307] as well as their impact on existing friction ridge matcher technologies [IR8307, IR8315] relative to existing contact based technologies.

Findings in [IR8307, IR8315] demonstrated a fundamental difference between images collected by contactless devices and their legacy contact-collected images that can impact matcher throughput, accuracy and forensic usability of these images thus underscoring the need to establish a way to clearly separate these new contactless images from legacy images. This Best Practices Recommendation (BPR) is based on the greater investigative effort undertaken by NIST and introduces an informative pathway that allows for the integration of contactless captured friction ridge imagery into systems for stakeholders that choose to support them, while preserving the integrity and separation of the legacy friction ridge infrastructure.

While this BPR allows for the ingestion and processing of such images, a certification process for the forensic quality of these contactless images (such as FBI's Appendix F Certification [APF]) is not yet in place, and the target audience for this guidance are stakeholders that wish to integrate these devices for piloting and test purposes right now. Acceptance of this informative BPR shall not be construed as the acceptance of contactless imagery by other stakeholders unless explicitly agreed to by all parties involved in the processing pathway.

It should be noted that this BPR is being developed with the intention of eventual amendment to the ANSI/NIST standard to formalize it as a normative guidance once the community of interest gauge the technology (including back-end components) sufficiently mature for acceptance.

This document does not directly specify the capabilities or performance of the data repository, matching system or other components in the operational use-case. Those requirements are driven by operational needs of the use-case.

2. Background

In 2004, the Fast Capture Initiative (FCI) was launched as a collaborative effort across multiple agencies within the U.S. Department of Justice to develop prototypes capable of collecting ten rolled-equivalent fingerprint impressions in 15 seconds or less. U.S. Government funded several prototypes which were produced with varying degrees of operational readiness, each with particular strengths. Since the FCI, technologies have emerged that are able to meet the requirement of fast capture speed. The devices that emerged as a result of this effort and were able to meet this speed requirement were predominantly contactless in nature. While the paramount goal of FCI was to capture fingerprints quickly, the emergence of contactless fingerprint capture seemed to be a welcomed side-effect as it emerged in the various prototype devices from the perspective of potentially limiting pathogen spread.

Contact-based capture devices have certain intrinsic challenges that may be addressed by contactless capture devices. Anecdotal evidence suggests that:

[1] The terms "contactless fingerprint capture" and "contactless devices" apply to capture devices and imagery captured by these devices that may be stationary (fixed in-place, such as sitting on a desktop) or mobile (hand held or otherwise not tethered) devices. Additionally, a capture device physically attached to a computer located in a vehicle that acquires fingerprints in a contactless fashion is also considered a mobile contactless capture device for the scope of this document.

1. Making physical contact with the device may allow for pathogen transfer between successive subjects who have made contact with that device.
2. Making physical contact with the device may allow for contaminant transfer from the subject to the device capture platen resulting in potential degradation in device performance.
3. Making physical contact with the device (and correctly situating the hand for proper contact interaction) may be a time consuming and error prone process.
4. Operator making physical contact with the subject during rolled capture collection to position, hold and guide fingers may allow for pathogen transfer from subject to operator.
5. Contact with a platen will cause plastic deformation of the friction ridge surface that can vary according to the pressure exerted and may not be generally repeatable.
6. Sweat from fingers can obscure details of the friction ridges on contact with a platen.

While contactless devices may provide revolutionary benefits, the images from these devices are fundamentally different according to definitions of characteristics present in traditional contact-collected images [IR8307].

These differences can hamper the ability of stakeholders to ingest images from these devices in the same operational pathways used for processing traditional friction ridge imagery. Images from contactless devices can negatively impact both the accuracy and throughput of existing systems [IR8315].

Additionally, these nascent technologies have exhibited endemic challenges (see section 5 for more information) that can hamper the processing of these new images in the existing friction ridge eco-system.

Finally, the devices must render images that are of a sufficient forensic quality to allow them to be used effectively for biometric recognition, which can include both identification, verification or more general recognition applications, as well as assure interoperability with legacy systems and devices. Currently in the United States contact-capture devices typically must meet the certification and standards put forth by the FBI through its Electronic Biometric Transmission Specification (EBTS) Appendix F [APF] certification process. An analogue for this certification process is currently not available yet, but being developed by NIST in collaboration with stakeholders.

3. Scope

This document is applicable to systems and stakeholders that would like to integrate contactless devices into their respective systems.

Contactless devices for the scope of this document include:

Stationary devices
Portable/hand-held purpose built devices
Portable/hand-held mobile-phone based devices
Portable/hand-held mobile-tablet based devices
Contactless capture devices tethered in a vehicle (hand-held, mobile or desktop)

This document in its initial release is limited in scope and aims to provide a pathway for the packaging and interchange of contactless fingerprints with safeguards to existing data. It also provides some anecdotal evidence for the collection process given observations during the data collection phase of the project.

This document will be updated with additional guidance on the completion of the NIST device test guidance as well as other studies that are currently underway.

4. Contactless Fingerprint Integration Goals

The goal of this BPR is to facilitate the submission of contactless fingerprints into existing infrastructures. To achieve this, modifications to the ANSI/NIST standard are introduced here with the following criteria taken into consideration:

1. To formulate a transaction that presents minor changes such that contactless fingerprints are not readily ingestible by existing systems. This is to prevent unconstrained contactless submission into contact-based systems because:
    a. Not all system owners may be ready to accept these transactions into their system.
    b. Some modern systems process incoming biometric encounters and attempt to improve their reference database if they detect a better quality encounter. In these systems there is a risk of unexpected inbound contactless images inadvertently replacing traditional contact-collected images resulting in unforeseen repercussions.
2. To formulate a transaction that requires minimal changes to the system for processing (once the system operator is able to accept contactless), and preserves backward compatibility with minimal effort.
3. To formulate a transaction that can include the original sensor data, in addition to the interoperable image in the event that vendors methods for rendering interoperable images improves and a need arises to recharacterize the images at a later date.

It should be noted that the goal of promoting contactless capture is not to replace traditional contact capture.

Finally, it is again emphasized that acceptance of this informative BPR shall not be construed as the acceptance of contactless imagery by all stakeholders unless explicitly agreed to by all parties involved in the transaction pathway.

5. Capture and Collection Guidance

The data collection effort leading to the development of this document as well as [IR8307, IR8315] yielded several observations. While these observations have not been formally tested, they have been identified by the collection team as factors that may improve the capture process.

5.1. Observed Collection Issues

Motion Stability: For portable capture devices, motion of the device or the subject can negatively impact capture. The most challenging scenario encountered was that of moving/unstable capture device coupled with a moving/unstable subject.

Background motion stability: Portable devices appeared to have more difficulty completing their collection where the background of the hand(s) comprised of moving objects or people.

Background uniformity: Noisy backgrounds (patterned imagery) impacted capture speed and success of portable capture devices.

Background contrast: Having insufficient optical contrast between the subject's hands and background negatively impacted the ability to perform the capture.

Errant lighting: Errant light sources and light noise into the capture device (portable or stationary) negatively impacted capture ability.

Inadequately Bounded Capture Volume: Having a spatially unconstrained environment caused capture difficulties with the subject moving out of the field of capture or optimal focal range.

5.2. Suggested Guidance For Capture

Given the observations by the data collection team, the following suggested guidance are made to help improve the collection process.

For portable devices, image capture success can be improved by having the subject steady themselves in front of the operator within the allowed capture volume of the device with their palms facing up (parallel to the ground). A marker or guide can be placed on the ground for the subject to limit drift in their location.

For stationary devices, care should be taken to safeguard the device against errant light sources around the collection device.

For all devices, effort should be made to steady the subject being fingerprinted, and presentation of their fingerprints be made parallel to the capture plane of the collection device.

6. Quality Estimation

Quality algorithms currently in use on contact-collected images shall **NOT** be used on contactless collected imagery unless the algorithm in question has been explicitly tested and noted to work on contactless imagery. Anecdotal evidence from preliminary testing at NIST using the NIST Fingerprint Image Quality algorithm (NFIQ2) [NFIQ] has shown that contactless images are fundamentally different than their contact-collected counterparts yielding very different signal characteristics that quality estimation algorithms such as NFIQ2 often depend on to function properly. This can yield inaccurate or unpredictable results in quality estimation.

7. Data Interchange Guidance

Unless otherwise noted, the fields and tables defined in Sections 7.2 to 7.4 modify and build upon the definitions of [ANST, Table-8/IMP], [ANST, Type-9 record], [ANST, Type-14 record] and [ANST, Type-20 record].

7.1. Overview of Derived Changes to the ANSI/NIST Standard

The contactless fingerprint submission guidance here is based on the existing ANSI/NIST Type-9 and Type-14 records includes the following key changes:

1. Replaced Friction Ridge Impression types table in [ANST Table 8] with Table 1 of this BPR. Changes introduce new contactless impression types to prevent inadvertent processing of contactless transactions following this BPR by systems not expressly configured to do so, or where the use of contactless images is not operationally approved.

2. Updated Type-9 record field 9.003 (IMP) to reference Table 1 of this BPR.

3. Updated Type-9 record field 9.904 (MMS) to include additional information on the capture solution being used, including information on commercially available off the shelf (COTS) hardware platforms such as a mobile phone if used.

4. Updated Type-14 record field 14.003 (IMP) to reference Table 1 of this BPR.

5. Updated Type-14 record field 14.901 (FCT) allowable value to only "1" (Other) if used for backward compatibility purposes.

6. Updated Type-14 record field 14.904 (MMS) to include additional information on the capture solution being used, including information on COTS hardware platforms such as a mobile phone, if used.

7. Updated Type-20 record field 20.904 (MMS) to include additional information on the capture solution being used, including information on COTS hardware platforms such as a mobile phone, if used.

7.2. Modified Impression Type (IMP) Metadata

The ANSI/NIST standard defines metadata which is used to describe the impression type for each friction ridge image packaged in an ANSI/NIST compliant transaction [ANST, Table 8] including contactless friction ridge impressions using IMP codes 24, 25, 41 and 42. These legacy contactless impression types however were developed prior to the maturation of this technology and did not represent the capabilities of these devices well. Therefore the legacy contactless impression types have been deprecated. These legacy contactless impression types shall not be used for any transactions created using this BPR.

This BPR provides new definitions for contactless capture (see Table 1) using IMP codes 43 and 44.

Marking a contactless impression as enrollable (IMP 44) must be done with all parties subject to exchange of biometric data using this BPR in agreement. Furthermore, agreement between parties to allow for enrollment of contactless imagery may be subject to a formal contactless capture device certification program agreed to by those parties to ensure that contactless images marked as (IMP 44) are from contactless capture devices able to yield images fit for inclusion in the biometric reference database.

Table 1 - Friction Ridge Impression Types (IMP)

Exemplar Prints		
Contact Impressions (Legacy/Unchanged)		
Plain Contact	0	Finger(s) presented still on platen
Rolled Contact	1	Finger rolled on platen
Live-scan swipe	8	Finger swiped on platen
Contactless Acquisitions (New)		
Contactless – Search Only	43	Contactless capture intended for search only, **shall not** be enrolled in gallery.
Contactless – Search or Enroll	44	Contactless capture for search and/or enrollment in biometric reference database.
Plain contactless – stationary subject	*24*	**Deprecated.** Maintained for backward compatibility, but **shall not** be used in the scope of submissions created in the scope of this BPR.
Rolled contactless – stationary subject	*25*	**Deprecated.** Maintained for backward compatibility, but **shall not** be used in the scope of submissions created in the scope of this BPR.
Rolled contactless – moving subject	*41*	**Deprecated.** Maintained for backward compatibility, but **shall not** be used in the scope of submissions created in the scope of this BPR.
Plain contactless – moving subject	*42*	**Deprecated.** Maintained for backward compatibility, but **shall not** be used in the scope of submissions created in the scope of this BPR.
System integration exceptions		
Other	28	
Unknown	29	
Latent prints		
Latent image	4	Image or impression of friction skin deposited on a surface

7.3. Modified Type-9 Record Structure

Transactions enabled by this BPR shall allow for the inclusion of a vendor generated minutiae template in addition to the mandatory contact-compatible friction ridge imagery as contained in the Type-14 records. The recipient however is not obligated to use the template and can generate their own using the mandatory contact-compatible friction ridge imagery.

Table 2 - Modified Type-9 Record Layout

Field Number	Mnemonic	Content Description	Cond Code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
9.003	IMP	IMPRESSION TYPE	M	N	1	2	Table 1 of this BPR	1	1
9.904	MMS	MAKE/MODEL/SERIAL NUMBER	D					0	1
	MAK	Capture device make	M	U	1	50	none	1	1
	MOD	Capture device model	M	U	1	50	none	1	1
	SER	Capture device serial number	M	U	1	50	none	1	1
	FSV	Capture device firmware/software version	M	U	1	50	none	1	1
	CRT	Capture device certification code	M	U	1	255	none	1	1
	DMO	Capture device mobility designation	M	A	3	3	DMO=MOB, STA,TET	1	1
	DCT	Capture device COTS designation	M	A	1	1	DCT = Y, N	1	1
	DSR	COTS device serial number	M↑	U	1	50	none	1	1

7.3.1. Field 9.003: Impression type / IMP

This mandatory field shall indicate the manner by which the friction ridge was obtained. This field shall use the updated impression types defined in Table 1 of this BPR.

7.3.2. Field 9.904: Make/model/serial number / MMS

This dependent field contains the make, model and serial number for the capture solution. This field is mandatory when a contactless impression type is specified (IMP 43 or 44). Optionally it can contain the underlying COTS device serial number, for example, in the case of a mobile phone running a capture app. It shall consist of eight information items. The information items are provided in Table 3 below.

Table 3- MMS Information Items

Content Item	Content Description
Make / MAK	Capture device make, Mandatory
Model / MOD	Capture device model, Mandatory
Serial number / SER	Capture device serial number, Mandatory This is the serial number for the capture solution. The capture solution can be (for example) a desktop contactless scanner, an automated scanning booth, or a hand-held solution using either COTS or custom hardware. If the solution uses COTS device (such as a mobile phone), DCT shall be Y and the COTS device serial number shall be included in DSR as well.
Firmware/Software version / FSV	Capture device firmware/software version, Mandatory Firmware in this context can include the code embedded on the device which is used to capture the fingerprint from the device sensor. Software in this context can include the code which operates on the fingerprint captured from the device sensor and transforms that data into a contact-compatible representation.
Certification number / CRT	Capture device certification identifier, Mandatory (for example, FBI assigned certificate code) If a certification identifier is not available, NONE shall be inserted into this field.
Device mobility / DMO	Capture device mobility designation, Mandatory Desktop/stationary location: STA (not mobile) Handheld mobile device portable: MOB (mobile) Desktop device in vehicle or portable rig: TET (mobile)
COTS Designation / DCT	Capture device COTS designation, Mandatory Device manufactured as a unit: N Solution is app on COTS device (i.e., mobile phone, tablet, laptop or some other device that provides a host device sensor): Y
COTS Serial number / DSR	COTS device serial number, Optional Mandatory if DCT is Y This is the serial number of the underlying COTS device (such as a mobile phone) that makes up the end-to-end capture solution. If the serial number of the device is inaccessible due to security constraints, UNKNOWN shall be inserted into this field.

7.4. Modified Type-14 Record Structure

The Type-14 record shall contain and be used to exchange contact-compatible fingerprint image data, such as a rolled equivalent ten-print, an identification flat, or a complete friction ridge exemplar. All fingerprint impressions shall be acquired from a single-finger or multiple-finger contactless capture device.

All attributes and fields for the Type-14 record are incorporated as defined in [ANST], with the exception of the changes noted in Table 3 below and this section, which supersede fields defined in [ANST].

Table 4 – Modified Type-14 Record Layout

Field Number	Mnemonic	Content Description	Cond Code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
14.003	IMP	IMPRESSION TYPE	D	N	1	2	Table 1 of this BPR	1	1
14.901	FCT	FRICTION RIDGE CAPTURE TECHNOLOGY	O	N	1	2	FCT = 1	0	1
14.904	MMS	MAKE/MODEL/SERIAL NUMBER	D					0	1
	MAK	Capture device make	M	U	1	50	none	1	1
	MOD	Capture device model	M	U	1	50	none	1	1
	SER	Capture device serial number	M	U	1	50	none	1	1
	FSV	Capture device firmware/software version	M	U	1	50	none	1	1
	CRT	Capture device certification code	M	U	1	255	none	1	1
	DMO	Capture device mobility designation	M	A	3	3	DMO=MOB, STA,TET	1	1
	DCT	Capture device COTS designation	M	A	1	1	DCT = Y, N	1	1
	DSR	COTS device serial number	M↑	U	1	50	none	1	1

7.4.1. Field 14.003: Impression type / IMP

This dependent field shall indicate the manner by which the fingerprint was obtained. This field shall use the updated impression types defined in Table 1 of this BPR. This field is mandatory if an image is present in Field 14.999: Fingerprint image / DATA or referenced in Field 14.994: External file reference / EFR.

7.4.2. Field 14.901: Friction ridge capture technology / FCT

If this optional field is used for backwards compatibility, it shall be populated with "1" (mapping to "Other" in [ANST, Table 11]) when a contactless impression type is specified (IMP 43 or 44).

14.901/FCT is an optional field in the Type-14 record as defined in [ANST] and is populated with a code [ANST, Table 11] signifying the type of technology used to capture the friction ridge image.

Since contactless technologies are still emerging, [ANST, Table 11] does not yet reflect all capture technologies for contactless. This will be revisited in a later revision of the BPR.

7.4.3. Field 14.904: Make/model/serial number / MMS

This dependent field contains the make, model and serial number for the capture solution. This field is mandatory when a contactless impression type is specified (IMP 43 or 44). Optionally it can contain the underlying COTS device serial number, for example, in the case of a mobile phone running a capture app. It shall consist of eight information items. See Table 3 for a list of information items in MMS.

7.5. Modified Type-20 Record Structure

The optional Type-20 record is designed to contain the source representation from which other Record Types were derived. For example, a source image containing multiple latent fingerprints would be included as well as individual segmented latent fingerprints in Type-13 records.

The optional Type-20 record may be used by vendors as a mechanism by which they can transmit the original raw sensor data (i.e., point cloud information, image stack, etc.) for archiving by stakeholders. This raw data consists of all data and metadata collected by the contactless capture device collection sensor that is used by the contactless solution vendor to algorithmically render the contact-compatible Type-14 image(s), and thereby serves as the source representation for the contact-compatible imagery.

This optional data is intended to be archived by stakeholders for possible use in the future. In the event that algorithms used to render contact-compatible images are improved by the vendor, the new algorithms can be used to reprocess the archived original sensor data to render improved contact-compatible images without having to recapture the subject.

The raw sensor data can be stored in the 20.999 field (DATA). While there are no constraints for the format and organization of this data beyond compliance to this BPR and ultimately to [ANST], it is required that the vendor employ aggressive lossless compression when encoding this data in order to minimize the impact of this archival information in the transmission package. Furthermore, the included data must contain any and all information the vendor may need to render the contact-compatible image(s) again.

The software needed to reprocess the images can be obtained from the vendor by the stakeholder(s) when available/as needed. The ANSI/NIST transaction shall not be used to transmit binary code to support this purpose.

All attributes and fields for the Type-20 record are incorporated as defined in [ANST], with the exception of the changes noted in Table 5, which supersede fields defined in [ANST].

Finally, it should be noted that inclusion of Type-20 may incur a significant impact on resources for all parties involved in the processing pathway. Given this, stakeholders in the processing pathway may impose restrictions on the inclusion, retention or processing of Type-20 as a system operation decision independent of this BPR.

Table 5 - Modified Type-20 Record Layout

Field Number	Mnemonic	Content Description	Cond Code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
20.904	MMS	MAKE/MODEL/SERIAL NUMBER	D					0	1
	MAK	Capture device make	M	U	1	50	none	1	1
	MOD	Capture device model	M	U	1	50	none	1	1
	SER	Capture device serial number	M	U	1	50	none	1	1
	FSV	Capture device firmware/software version	M	U	1	50	none	1	1
	CRT	Capture device certification code	M	U	1	255	none	1	1
	DMO	Capture device mobility designation	M	A	3	3	DMO=MOB, STA,TET	1	1
	DCT	Capture device COTS designation	M	A	1	1	DCT = Y, N	1	1
	DSR	COTS device serial number	M↑	U	1	50	none	1	1

7.5.1. Field 20.904: Make/model/serial number / MMS

This dependent field contain the make, model and serial number for the capture solution. Optionally it can contain the underlying COTS device serial number, for example, in the case of a mobile phone running a capture app. This field is mandatory when the Type-20 record contains the source representation(s) of contactless impressions that accompany contactless derived Type-9 or Type-14 records (with IMP 43 or 44). It shall consist of eight information items. See Table 3 for a list of information items in MMS.

8. Conclusions

This BPR is fashioned to help stakeholders with the integration of contactless fingerprints into existing systems with minimal modification to those systems. This ensures that such transactions cannot be inadvertently processed unless explicitly accommodated for in the orchestration layers of those system.

This BPR also incorporates measures that allow for the integration of a formal certification pathway once that has been established, as well as the ability to improve and reprocess already-captured images by allowing for the retention of original sensor data.

This BPR is intended as an informative guidance document for immediate voluntary adoption by stakeholders while providing assurances that as the technology matures and the need arises for a normative document it can be incorporated into the ANSI/NIST standard.

While this BPR lays out an informative path for the incorporation of contactless fingerprint images into existing systems, a certification process for the forensic quality and usability of these contactless images (such as FBI's Appendix F Certification [APF]) is not yet in place. Acceptance of this informative BPR by one party shall not be construed as the acceptance of contactless imagery by other stakeholders unless explicitly agreed to by all parties involved in the processing pathway, especially given measured impact they can have on the operation of legacy systems.

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