INTEGRATED BIOMETRICS

Sizing Up the Standards

FAP50, FAP60, and How to Choose the Right 10-Finger Mobile Fingerprint Scanner

Consider two law enforcement officers. Both must locate a dangerous criminal in a part of town where police are not necessarily welcome. They each think they've found their person, but must verify that individual's identity before they can make the arrest.

One officer has his partner hold the handcuffed suspect against the ground while he returns to their car. In the trunk, inside a padded case, is a fingerprint scanner, along with a battery pack for power. He carries the case back to the scene. Meanwhile, a hostile crowd gathers, and an already difficult situation grows more dangerous by the minute.

The other officer takes a different approach. She corners and cuffs her target. Then she pulls a small livescan fingerprint scanner from her uniform pocket. While her partner helps, she attaches the device to her cell phone and puts the fingers and thumbs of each of the suspect's hand against the device's sensor. The confirmation is almost instantaneous – they have the right person. The arrest made, they head back to their car quickly before word spreads around the area.

The 10-Finger Mobile Enrollment Challenge

10-finger enrollment and verification goes back to the very beginning of fingerprints' use as a means of identification. Paper-based Federal Bureau of Investigation (FBI) fingerprint records relied upon both flat and rolled images, using each to ensure the correct recording of the other. Most of the prints originally captured with ink and paper in FBI databases were created using a basic template with a 3.2" x 2" area for 4-finger flats and 1.6" x 1.5" spaces for ten rolled finger images.

The advent of optical fingerprint scanners introduced new challenges along with the benefits of digital fingerprint capture, storage, and recall. The latest FBI Electronic Biometric Transfer Specification 10.0, issued in 2013, mandated that enrollment records must consist of two flats of four fingers, each flat corresponding to one hand, followed by a flat of both thumbs.

Criminal booking or inquiry continues to require a full, historical ten-print record, including both four flats and ten rolls. Fingerprint devices that meet these requirements are typically cumbersome and available only in a desktop environment such as a police station.

To ensure image quality, the FBI mandates that optical fingerprint scanners meet stringent requirements for resolution, compression, and other factors that affect the reliability of captured images. Today, the FBI's Appendix F certification for livescan Type 4 records is the accepted standard for AFIS-compatible databases and other international fingerprint repositories.

While desktop scanners often meet FBI Appendix F standards, mobile fingerprint scanners capable of 4-finger flats and 10-finger enrollment routinely fail to meet these needs. Either they are too bulky and consume too much power to be practical in the field, or they do not meet the requirements for Appendix F certification.

The FAP50 format joined FAP60 as an officially recognized "mobile" format in 2016. FAP50 mobile scanners use the original 3.2" x 2" 4-finger recording area of the paper era, introducing the possibility of even smaller mobile units than is possible with FAP60 devices.

In response, law enforcement, border control, and intelligence agencies frequently employ 1- and 2-finger mobile scanners to generate multiple images, and then combine these images into composite 4-finger records. The FBI does not approve of this practice since combination affects the overall image quality, as well as introduces the possibility of sequencing errors due to scanning fingers out of order. At the same time, the FBI often overlooked combination image usage, recognizing the historical lack of a practical mobile 10-finger mobile enrollment alternative.

Recent Innovations in Mobile Enrollment and the FIVE-0 FAP50 Scanner

After 9/11, the urgent need for real-time, online identity management created an equally urgent demand for 10-finger optical scanners using a 3.2" x 3" surface area. The belief at the time was that it was easier to place hands on a larger 3.2" x 3" surface, rather than the traditional paper-based 3.2" x 2" dimensions. These scanners recorded 10-finger flat images, which could be recorded faster than rolled impressions, in fewer than 10 seconds, in accord with the "US Visits" program driven by the DHS and FBI.

Today, approved scanners using either surface area can generate Type 4 results, and the 3.2” x 3” format is the basis for the Fingerprint Acquisition Profile (FAP) 60 standard. Several vendors claim to have livescan FBI Appendix F certified products for 10-finger mobile use. These units almost universally meet the FAP60 requirements.

The FAP50 format joined FAP60 as an officially recognized “mobile” format in 2016. FAP50 mobile scanners use the original 3.2” x 2” 4-finger recording area of the paper era, introducing the possibility of even smaller mobile units than is possible with FAP60 devices. In short, with the creation of the FAP50 format, the FBI and NIST established the groundwork for Integrated Biometrics’ FIVE-0, an exceptionally small and lightweight FBI-certified Appendix F livescan device.

FIVE-0 and FAP60 Mobile Scanners – Is There a Difference?

10-finger capture has long been practical on desktops in fixed locations, such as offices. The mobile challenge has come from generating new technology that is sufficiently small, lightweight, and power-efficient, as well as able to function under heat, cold, bright light, and direct sunlight that users regularly encounter in the field.

FAP50 scanners, such as FIVE-0, represent the most compact and portable option for mobile 10-finger enrollment, verification, and booking. Since the FAP50 scanning surface is smaller, a device using an FAP50 sensor should be more compact and lightweight than a device that uses an FAP60 sensor.

Many security professionals have only known FAP60 10-finger scanners. They mistakenly believe that the smaller surface area of the FAP50 standard means lower-quality scans or lower performance. In truth, both FAP50 and FAP60 units deliver identical 4-finger livescan results. There is no difference in quality or performance, as shown in the following table from the National Institute of Standards and Technology (NIST) Special Publication 500-280v2 (p. 19, Table 3):

Capture	**FAP 45**	**FAP 50** [18]	**FAP 60**
Acquire Flat Images	Yes	Yes	Yes
Acquire Rolled Images	Optional	Optional	Optional
Minimum Gray Levels	256	256	256
Acceptable Image Resolution	500 +/- 1%	500 +/- 1%	500 +/- 1%
Minimum Image Dimension	1.6” x 1.5”	3.2” x 2.0”	3.2” x 2.0”
Maximum Compression Ratio	15:1	15:1	15:1
Compression Algorithm	WSQ 2.0+	WSQ 3.1+[19]	WSQ 3.1+[19]
Simultaneous Number of Fingers	1-4[21]	1-4[22]	1-4
Sensor Certification	Appendix F	Appendix F	Appendix F

In short, any fingerprint scanner that meets FBI Appendix F certification standards delivers the same quality scan, including image resolution, compression, and area of each finger covered. All AFIS-based law enforcement, border control, counter-terrorism, and national ID databases see 10-finger scans from FBI-Certified, Appendix F-compatible units as the same, regardless of whether they come from FAP50 or FAP60 units.

Integrated Biometrics' FIVE-0 scanner uses a different underlying technology from other fingerprint scanners. The company's patented light-emitting sensor film, laminated to a TFT or CMOS camera, enables a much more compact device than larger, heavier, and more power-hungry FAP60 mobile units that rely on glass platens and complicated backlit prism assemblies. Integrated Biometric's light emitting film is well-established in the marketplace, with hundreds of thousands of units in use through products such as the Kojak 10-finger desktop scanner and the Watson Mini and Sherlock 2-finger roll scanners.

Why is Integrated Biometrics' FIVE-0 the Only FAP50 Optical Fingerprint Scanner?

Other sensor technologies are difficult to engineer to meet the FAP50 standard. Light emitting film is the breakthrough that makes FAP50 mobile devices such as FIVE-0 possible. It also delivers a definitive performance advantage when it comes to mobile enrollment and verification in direct sunlight, or with subjects with cold and dry fingers, or with latent prints on the platen. Five-0's rugged design supports mobile applications where a tough, dependable device is needed most, such as police, military, and border applications. FIVE-0 even enforces correct finger placement, ensuring full prints.

FIVE-0 – The Ultimate Mobile FAP50 Enrollment Solution

FIVE-0 is an unprecedented combination of portability, Appendix F certification, and performance under challenging physical conditions that no other scanner currently on the market can match. This powerful device appeals most to organizations who need its small size, exceptional reliability, and low energy consumption to enroll, verify, and book in the field.

As mobile enrollment becomes increasingly established across law enforcement, border control, and intelligence operations, older methods of identification will inevitably give way to devices such as FIVE-0. Management will recommend against transporting suspected illegal immigrants, criminals, or terrorists to fixed facilities when verification and booking can take place at the point of first contact.

When it comes to mobility, small and rugged is better, which is why an FAP50 device is ideal. FIVE-0 is the first FAP50, FBI Appendix F certified optical 10-fingerprint scanner that fits in a shirt pocket. When portability is at a premium, FIVE-0 is the mobile enrollment solution.

About Integrated Biometrics

Integrated Biometrics, LLC designs and manufactures FBI-certified fingerprint sensors for identity solutions serving government agencies, commercial organizations, and consumer markets worldwide. Our technology utilizes a durable, patented, light emitting sensor (LES) film which outperforms traditional prism-based devices in accuracy, power consumption, and usability, while being up to 90% smaller. These innovative sensors enable organizations to enroll and verify individuals within large populations for use in national ID programs, elections, social services, homeland security, law enforcement and military operations. Integrated Biometrics offers the only Appendix F FBI-certified sensors that meet the mobility requirements demanded by end users.

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