

# **Policy for Acquisition and Implementation of Livescan, Cardscan and Photo Imaging Systems**

**For Electronic Submissions to DCJS**

**Revised November 2006**

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For Electronic Submissions to DCJS  
(November 2006)**

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**I. Overview**

Agencies considering the acquisition of livescan, cardscan, and/or photo imaging (mugshot) devices for integration into their operations should consider, at a minimum, the steps below:

- A. Understand the nature and basic functionality of livescan, cardscan, and photo imaging systems (also known as digital mugshot systems)
- B. Determine how livescan or cardscan devices would be integrated into your agency's processing operations
- C. See if a regional or a county-wide implementation can be achieved

Note: DCJS will not accept electronic submissions from a completely stand-alone criminal site unless prior authorization is sought and granted by DCJS

- D. Investigate the integration of a new or existing photo imaging system. Currently, all new civil and criminal sites are expected to submit photo images with their transactions. A decision on the possible capture and utilization of scar, marks and tattoo (SMT) information should also be made.
- E. Determine the method to integrate any existing records management (RMS), jail management system (JMS), or other information system with the new livescan/cardscan system, so that data for electronic transmission can be shared between the systems. Duplicative data entry of information should be eliminated as much as possible.
- F. Determine the mandatory and desirable features that should be incorporated into the livescan, cardscan, and/or photo imaging system that your agency wishes to purchase
- G. Understand the network requirements for two-way communications with the DCJS 'Store and Forward' system
- H. Identify the rapsheet delivery sites and the mechanism to be used for rapsheet delivery. In almost all cases, DCJS expects the agency to utilize eJusticeNY for transaction tracking purposes. Your eJusticeNY monitoring in order to take advantage of the rapid DCJS and HDK receive available out-of-state information in a timely fashion.
- I. Be aware that DCJS has published the "New York State Criminal Justice Electronic Transmission Standard" (NYSCJEDTS), which is available by using the blind

internet link of “<http://criminaljustice.ny.gov/advtech/ebts.pdf>”. This document should be very familiar to whatever vendors are used, though it’s seldom used much by individual agencies and departments.

- J. Coordinate with DCJS at all steps of the process. A number of technical details for specific data fields need to be understood and coordinated with DCJS. For example, if arrest processing is being considered, the agency must understand the assignment and return of the ‘Criminal Justice Tracking Number’ (CJTN) by DCJS, how the NYS Coded Laws Table should be used for proper selection and editing of applicable arrest charges and how to periodically update the table locally, and all current provisions for submitting other transactions (sex offender, supervision, institutional admissions, and dead prints).
- K. Identify the nature of the procurement process to be used for this acquisition
- L. Make the purchase and work with the vendor(s) and DCJS to establish testing requirements to ensure a smooth implementation and transition to the new system
- M. If your agency will be implementing a new server (rather than utilizing an existing server at another agency), obtain and answer the latest ‘Checklist for Store and Forward Livescan/Cardscan Test Readiness’, and return it to DCJS before pre-implementation testing can be scheduled. A checklist is also required for every agency wishing to submit civil transactions. See the next item for how to obtain the pertinent checklist.

## **II. DCJS Support**

- A. Contact the DCJS Customer Contact Center at 1-800-262-DCJS (or email at [CCCenter@dcjs.state.ny.us](mailto:CCCenter@dcjs.state.ny.us)) and ask that they in turn please forward an email to the ‘Store and Forward Implementation Team’ regarding any of the following issues:
  - 1. If you have any questions concerning interfacing your livescan, cardscan, or photo imaging systems with DCJS' Store and Forward system
  - 2. To obtain a civil or criminal checklist
  - 3. To obtain a test plan, if testing is required
  - 4. For information on network issues involving transmission to and from DCJS
  - 5. For information on eJusticeNY Kvgi tcvf "Lwkeg"Rqt vrl enrollment or training
  - 6. For information on proper fingerprinting technique (ink or livescan)
- B. After deciding to purchase a livescan, cardscan, or photo imaging system, the agency next must identify the system's mandatory and desirable features and local requirements. DCJS will work with an agency and its vendor on these items, if requested.

## **III. Livescan and Cardscan Specifications**

- A. Background

New York State law enforcement agencies normally are required to fingerprint arrested individuals multiple times to meet local, state and federal requirements. Some law enforcement agencies may have to enter the same data on multiple cards. Corrections institutions may also want to submit sentenced admission (incarceration) transactions. Many agencies, both criminal justice and/or state or local organizations and departments, may wish to submit various employment and/or permit application transactions.

Livescan and cardscan devices allow agencies to acquire fingerprints only once, with each finger and associated slap impression being analyzed for acceptable quality and uniqueness in real-time fashion. The fingerprints can then be transmitted and/or printed (if desired) on multiple copies as digital images. Agencies using a cardscan device will ink-and-roll an individual's fingerprints on a single fingerprint card, which is then scanned and which generates fourteen separate digitized fingerprint images. Livescan systems capture digital fingerprint images directly using a photo-optical device. Linking of an arrest booking module (RMS) or other computerized information system with a livescan or cardscan device allows the marrying of fingerprint images with biographic and related data and photo for the transmission of the combined information packet to DCJS. If using livescan technology, a local fingerprint card can be printed out, if desired, but must be printed on an FBI-certified printer. Photos sent to DCJS will be included in both the DCJS and FBI databases, when applicable.

B. Benefits of Livescan / Cardscan

Use of these devices has several benefits for agency operations:

1. Reduce (in many situations) the number of sets of fingerprints taken
2. Improve the quality of fingerprint images submitted, which will:
  - a. Assist DCJS in a more accurate identification process;
  - b. Provide better quality images for possible inclusion on SAFIS; and
  - c. Reduce rejections at DCJS of poor image quality or prints rolled out of sequence.
3. Improve the timeliness of positive identification responses at both the state and federal (when applicable) levels
4. Reduce redundant work and time required to process individuals through the booking or application process
5. Reduce the time from submission of fingerprints to DCJS to the receipt of the resulting rapsheet, including (when appropriate) the addition of the newest event

to an existing history or the establishment of a new history if not already found on the system

6. Permit the timely response from the FBI's Integrated Automated Fingerprint Identification System (IAFIS) search
7. Reduce the number of transposed or duplicate hands and/or individual fingerprint images through use of programming sequencing algorithms (slap-to-roll and roll-to-roll matching)
8. Reduce or eliminate card handling and associated mailing costs to DCJS

C. Livescan or Cardscan *Mandatory* Features

All systems must meet the following mandatory requirements:

1. The livescan or cardscan system must meet FBI Appendix F certification
2. If a local fingerprint card is to be printed, it should be printed on an FBI-certified printer
3. Fax transmissions of livescan cards printed at the local agency will not be accepted by DCJS
4. The cardscanning of fingerprint cards produced via a livescan process are not acceptable to DCJS
5. Transmission standards must meet the New York State Criminal Justice Electronic Data Transmission Standard (NYSCJEDTS), and should utilize the FBI-approved WSQ compression algorithm for the fingerprint images. These images should be compressed only once.
6. An agency must combine all related data and fingerprint images into a single transmission. Digitized photos (mugshots) must also (in almost all cases) be included in the transmission. Agencies can also include electronic signatures if they procure a digital signature pad. Palmprints are not accepted presently by DCJS, but may be in the next year or two.
7. The system must have automatic slap-to-roll matching (verification that the rolled impressions match the corresponding slap impressions). The manual overriding of a detected error must be transmitted to DCJS.
8. The system must have automatic roll-to-roll matching (verification that each rolled impression appears only once). The manual overriding of a detected error must be transmitted to DCJS.

9. The system must have automatic quality checking of rolled fingerprint images. The manual overriding of a detected error must be transmitted to DCJS.
10. The system must provide an operator with the opportunity to indicate that a finger is bandaged or amputated (birth defect, accident or injury, etc.). This information is required by DCJS and the FBI in the absence of any individual finger image.
11. The system should provide for a completeness check to indicate that both the fingerprint and textual data are transmitted together within the transaction
12. The system must be able to receive and respond to return messages from DCJS as specified in the NYSCJEDTS
13. Resubmission Indicator: This is an indicator to denote that the transaction being submitted has been previously transmitted to and rejected by DCJS (and in some cases, by the FBI), and is now being resubmitted with corrected data and/or new fingerprint images

The NYSCJEDTS complies with:

1. The New York Statewide Criminal Justice Data Dictionary (tenth edition, July 2001), with a few exceptions, such as name and address
2. The FBI's 'Electronic Fingerprint Transmission Standard', (EFTS-V7.1), with some exceptions, e.g., e-mail header fields
3. The 'American National Standard for Information Systems - Data Format for the Interchange of Fingerprint, Facial, & Scar Mark & Tattoo (SMT) Information' (ANSI/NIST-ITL 1-2000) with some exceptions, such as larger tag lengths.

D. Livescan or Cardscan *Desirable* Features

The following should be considered desirable if they are available on the vendor's livescan or cardscan equipment:

1. Integration of an Automated Palmprint Capture System - DCJS does not accept palmprints at the present time, but plans to develop the capability to store and utilize palmprints in the near future.
2. Integration or inclusion of a signature pad. While not required, the submission of a signature is highly desired by DCJS.

E. Local Booking or Information System Data Requirements

To enable the livescan or cardscan system to operate as intended, it should be integrated with any existing or proposed automated booking, records management, or information system for data entry. This integration avoids duplicative data entry, helps to ensure accuracy and completeness, and minimizes data entry errors.

#### **IV. Photo Imaging Standards and Guidelines**

##### **A. Background**

The costs and overhead associated with maintaining chemical-based photographic systems have been increasing while the cost of digital imaging systems is steadily decreasing. Chemical-based systems also have intrinsic safety issues involved with the safe storage and use of chemicals. Digital imaging is setting the stage for many computer-based applications, e.g., computerized line ups, rapid retrieval of high quality images, transmission of images between agencies, facial identification processes, and special computer enhancement techniques such as “aging.”

A statewide mugshot policy benefits agencies purchasing or upgrading photo imaging systems. It will also aid those departments that wish to exchange digitized images with other agencies. While all mugshots taken in a given agency might be uniform in their appearance, the uniformity may not be consistent with photos compared from different agencies. (Varying background, image aspect ratio, digital resolution, etc. could limit the value and result in defense challenges to mugshot line ups. Poor lighting, for instance, can create shadows causing facial images to look more sinister.) To ensure compatibility, a set of common standards is needed.

For a number of years, DCJS has been involved in the development of national fingerprint quality and transmission standards. Since 1995, DCJS has participated in the creation of mugshot image transmission standards and image quality guidelines. In 1993, the National Institute of Standards and Technology (NIST), along with the American National Standards Institute (ANSI), approved the ANSI/NIST standard, whose most current version is called the “American National Standard for Information Systems - Data Format for the Interchange of Fingerprint, Facial, & Scar Mark & Tattoo (SMT) Information” (ANSI/NIST-ITL 1-2000). This standard helps to ensure uniformity in the capture and exchange of fingerprint, mugshot, and SMT images and data. Additionally, NIST has issued a “Best Practice Recommendation for the Capture of Mugshots” (version 2.0), which is attached at the end of this document. DCJS has elected to use this recommendation as the **standard** for photo images electronically captured and transmitted to the State repository.

##### **B. State Initiative: Statewide Mugshot System**

DCJS is in the process of developing a statewide photo image and query system. This will provide participating agencies with the ability to request and retrieve mugshots via eJusticeNY. Participation requires adherence to the mugshot standards and guidelines



attached to this document. In the meantime, DCJS is eager and able to accept digital mugshots submitted *with* electronic ‘Store and Forward’ fingerprint transactions, and can return such photos and mugshots via eJusticeNY as part of a computerized criminal history.

C. State Initiative: Scar, Mark & Tattoo (SMT) Search Database

DCJS is considering a statewide investigative database with SMT information that would, when operational, allow a statewide database search based on SMT descriptors. For example, an agency could ask DCJS for a list of individuals with a blue eagle tattoo on the right arm. To build the database, SMT information would have to be provided to DCJS by criminal justice agencies when submitting arrest and other criminal justice data. This project is not currently funded for implementation.

D. FBI Initiative: FBI National Mugshot System

The FBI is now accepting mugshots as part of the Interstate Identification Index (III) portion of the FBI’s Integrated Automated Fingerprint Identification System (IAFIS). As the use of integrated booking systems develops around New York State, digitized mugshot images can accompany the digitized fingerprint data being sent to DCJS from livescan or card scan devices. Adherence to the following Mugshot Capture Guidelines will ensure the ability to successfully transfer data between agencies, allow for the establishment of “best practices” between agencies, and permit FBI acceptance of the mugshots and related information.

E. Mugshot Capture Guidelines

DCJS mandates that agencies wishing to capture and store mugshot images adhere to the latest version of the NIST “*Best Practices Recommendations*” (currently 2.0), initially developed at the Mugshot and Facial Image Workshop held in 1995 and updated a few times since. Attachment 1 contains the complete text of the latest “*Best Practices Recommendation*.” The most pertinent aspects of this standard are given below:

- At a minimum, always capture the centered, full-face pose, without glasses
- The subject’s eyes should be about 55% up from the bottom of the image
- The distance between the subject’s ears should be about half the width of the total image
- Use a minimum of three (3) point balanced lighting for subject illumination to eliminate shadows
- Use an 18% reflective gray background with a plain, smooth flat surface

- Capture the image with the Width: Height aspect ratio of 1:1.25
- The minimum number of 480 x 600 pixels in an electronic digital image (480 horizontal width x 600 vertical height)
- Color digital images represented as 24-bit RGB pixels (red, green, blue: 8 bits each)
- Use digital capture devices with a square pixel aspect ratio of 1:1.
- The compression algorithm is to conform to the JPEG Sequential Baseline. JPEG File Interchange Format (JFIF) will contain the JPEG compressed image data.

Adherence to these mandates will ensure that photo images are comparable between agencies. This compatibility will be particularly important for those agencies wishing to make photo comparisons with images from other agencies and/or to use such images in photo line-ups.

F. Electronic Interchange Standard

For the electronic interchange of mugshots, New York State has adopted as a **standard** the ‘American National Standard for Information Systems - Data Format for the Interchange of Fingerprint, Facial, & Scar Mark & Tattoo (SMT) Information’ (ANSI/NIST-ITL 1-2000). DCJS will use this standard for the transmission of mugshots and/or SMT images and data within New York State.

Agencies that wish to transmit facial images to DCJS or receive facial images from DCJS in the future will be required to comply with this standard. DCJS will also utilize this standard for transmission of mugshot images to the FBI.

Agencies that contract for mugshot systems need to ensure that the vendor complies with the current ANSI/NIST standard and the addendum, as referenced by the latest release of the New York State Criminal Justice Electronic Data and Image Transmission Standard (NYSCJEDTS).

G. Messages

The suite of messages required as a **standard** to support the statewide transfer of basic mugshot system capabilities between agencies with different vendors is contained in the NYSCJEDTS. The suite includes messages to request services, respond to requests, give verifications of message receipt, and provide error notifications.

## V. **Procurement Process**

An agency must decide if the department will procure the livescan, cardscan or mugshot systems off State contract, through a sole source purchase, or after issuance of a “Request for Proposal” (or RFP). The *FBI Certified Products List* contains a list of equipment that meets the FBI IAFIS image specifications for livescan and cardscan devices and fingerprint card printers, and is available at <http://www.fbi.gov/hq/cjisd/iafis/cert.htm>. The procurement process used by an agency will depend on:

- How quickly the purchase must be made;
- The features desired;
- Funds available;
- Whether the department is already using a particular vendor's equipment;
- Whether the agency will submit via an existing county or regional host server, needing compatibility with a system already in place.

### A. State Contract

There is a State contract in place that allows both the state and local agencies to purchase FBI-certified livescan and cardscan devices, photo/mugshot systems and associated integrator services. The contract is Group Number 38214 and is entitled “Identification Equipment Electric (Fingerprint and Photo).” There are a number of vendors to choose from in each lot. Individual prices can be obtained directly from the vendor. The contract information is available on the OGS web site at <http://www.ogs.state.ny.us/purchase/spg/pdfdocs/3821402204a.pdf>.

In addition, local agencies may purchase certain equipment off the SAFIS contract.

It is recommended that if a local government wishes to purchase equipment off the SAFIS contract, that such local government send a letter to DCJS requesting authority to so purchase. The letter should be addressed to the Deputy Commissioner of the Office of Systems and Operations. The letter should clearly state the anticipated usage of the equipment. The request should also clearly state that the obtained software and hardware will be tied into the SAFIS system, as distinguished from standing alone.

### B. Sole Source

If the agency does not wish to purchase off the State contract, the department can seek to justify a sole source acquisition. To justify a sole source acquisition, the agency needs to

develop a rationale why competitive bidding would not be necessary. A sole source justification might indicate that:

- The agency or its chosen host (county or regional server) already uses the vendor's equipment and purchase of the livescan or cardscan device is essential for compatibility. This argument might be reinforced if the agency has an on-going contract with the vendor.
- The vendor's equipment has unique features that are essential to the department's operations.

In developing and justifying a sole source justification, the agency should consult with your local counsel and MIS staff to identify any local practices or requirements, and to obtain advice about the adequacy of the rationale provided. Acquisitions based upon sole source justifications would probably be completed more quickly than the RFP process, but more slowly than a purchase off of State contract.

#### C. Requests for Proposal (RFP)

Development and issuance of an RFP requires that the agency:

- Provide background information about the need for the purchase;
- Identify the mandatory and desirable equipment features; and
- Delineate the criteria for evaluating the RFP responses.

DCJS staff should be contacted for clarification about the mandatory and desirable features. Local counsel should be consulted for information on the RFP format and other provisions that must be included in the RFP. Issuance and evaluation of an RFP would take the longest period before the equipment can be purchased and installed.

## **VI. System Installation and Implementation**

Once a vendor has been selected, a contract must be executed between the vendor and the municipality, unless a State contract purchase is involved. In working out the contract provisions, the agency needs to consider the following issues:

- You must decide if you want to print out local fingerprint cards for arrests, employment, or inquiries, and whether you need to print on one or both sides of the local cards

- With a liveness or cardscan system, your agency will be paying the maintenance cost. The vendor will have various maintenance options which you should match to your agency's needs.
- A new or revised *Use and Dissemination Agreement* between the implementing agency and DCJS may be needed. If so, it must be executed prior to implementation. Contact the DCJS Customer Contact Center (800-262-DCJS) to ascertain if such an update is needed.
- As discussed below, the agency, vendor and DCJS must agree on how to test the DCJS-vendor interface before the system is accepted and payment is made
- When needed and requested, DCJS will issue official certification to accept the automated system as satisfactory, thereby authorizing the vendor to receive payment under the project.
- The agency needs to work out with the vendor a plan for training agency staff to use the equipment. Agency staff should understand all the system's features and quality control mechanisms. For liveness installations, staff should be trained on how to fingerprint using such equipment.
- If an interface between systems is contemplated (such as data and/or photo sharing between an RMS or JMS system and a liveness system), agreements should stipulate the willingness of all vendors involved to jointly meet the State's requirements and to work compatibly for the success of the project
- A *pro forma* letter for a State contract purchase is required

The basic steps essential for DCJS-vendor system testing include:

- DCJS has a checklist prepared which must be filled out and returned to DCJS. You may obtain the current checklist by contacting the DCJS Customer Contact Center at 800-262-DCJS and asking them in turn to contact by internal email the DCJS 'Store and Forward Implementation Team', The checklist details items of great importance to the success of the project, such as e-mail and i.p. addresses, domain names, testing procedures, support issues, etc.
- If not already established, the agency must work with DCJS to ensure that the proposed data communications linkage via the NYeNet (or other agreeable and secure option) is agreeable and approved by DCJS.
- DCJS staff should be contacted to establish the time and other logistics surrounding the test transmissions and return messages to be expected

- The testing process must include the provisions detailed in the mandatory features referenced above
- Test transmissions should be tested and monitored based upon the schedule agreed upon by DCJS, your agency and the vendor

Once the system successfully passes these tests, the system can be moved into production. From DCJS' experience, the agency should be aware of the following post-installation issues that may occasionally occur:

- Poor quality prints may be transmitted because of inadequately trained staff. Fingerprinting technique is still critical even with the latest systems. Tips and technique training are available by contacting the DCJS 'Training and Quality Assurance Unit' at 518-485-7640.
- Failure of local personnel to keep the livescan platen device clean could result in deterioration of image quality
- Prints may be transmitted associated with the wrong data because fingerprint card data is entered and the wrong person is fingerprinted (e.g., individuals with the same or similar name as the arrestee). Also, in a cardscan environment, care must be taken to scan the correct card once the data entry step is completed.
- The local agency must provide DCJS with the names, telephone numbers, and normal business hours of local staff to assist in problem resolution
- If the DCJS Coded Law File is to be used, provision for periodic updating of the law table locally must be provided

## VII. Rapsheet Delivery

The current mechanism or procedure for rapsheet delivery to the local level should be reviewed.

DCJS requires that agencies installing Store and Forward systems should use eJusticeNY for delivery of rap sheets. Any exception to this policy requires Utilization of eJusticeNY also permits mandatory DCJS, and ascertaining their status mandatory HDKcpf "qvj gt" "FEU" {qw'uj qwf 'tgs wguv' "Egpvgt" "qm/hgg"3/: 22/484/54790

*Note: eJusticeNY Integrated Justice Portal enrollment and utilization is independent of Store and Forward participation, though the two technologies greatly complement each other. DCJS*

*encourages eJusticeNY Integrated Justice Portal enrollment for all criminal justice agencies regardless of livescan or cardscan intentions, and requires eJusticeNY Integrated Justice Portal participation for all civil submissions.*

### **VIII. Network Protocol Standards**

Transmissions to and from DCJS need to comply with the following **standard**:

The system must adhere to the protocol standards set forth in the *CJIS Wide Area Network Interface Specification CJIS-IC-0020* dated November 1995 for both transmission and receipt of transactions. The following will apply:

- A) Application: SMTP, MIME
- B) Transport: TCP
- C) Network: IP

The infrastructure of New York State's "NYeNet" is a statewide T1 network with frame relay access to regions throughout the state. For remote users to access the NYeNet, the data link and physical layer specifics will need to be decided on a system by system basis depending on what services are available at each location. NYeNet currently supports Ethernet connections (for equipment located in the same physical location as an NYeNet node) and frame relay connections (for equipment located in the same LATA as an NYeNet Network node). Any other method of communication needs prior approval from DCJS.

DCJS will permit the use of a Virtual Private Network (VPN) solution in conjunction with Internet connectivity in certain instances, with specified devices and protocols. Anyone wishing to utilize this technology is requested to contact DCJS for additional information.

# **Attachment 1**

Best Practice Recommendation for the Capture of Mugshots

Available on the Internet at:

[http://www.itl.nist.gov/iaui/894.03/face/bpr\\_mug3.html](http://www.itl.nist.gov/iaui/894.03/face/bpr_mug3.html)



# **BEST PRACTICE RECOMMENDATION**

## **FOR THE CAPTURE OF MUGSHOTS**

**Version 2.0**

**September 23, 1997**

The original version of the "Best Practice Recommendation" was initiated at the Mugshot and Facial Image Workshop which was held in Gaithersburg, MD on October 23-25, 1995. Developed as a recommendation, the implementation of the practices and principles described in that document makes the conversion of existing and ongoing photographic collections more uniform. It contains a suggested set of procedures and equipment specifications for organizations considering the purchase of new systems or the upgrade of current systems. The recommendation is not designed to render current and legacy mugshot collections unacceptable. Rather, it is intended as a means of establishing or improving interoperability between mugshot systems.

The information contained in this updated revision of the "Best Practice Recommendation", Version 2.0, does not alter any of the individual points that were consensually agreed upon and included in the original version of this recommendation. It does provide additional details and clarifications for many of those points and has been supplemented with information regarding depth-of-field and exposure considerations.

This recommendation reflects a minimum set of common denominators. The provisions of this recommendation are keyed to the quality aspects associated with the unaltered captured mugshot image. For new mugshot images being captured, the specifications contained in this recommendation are equally applicable to real-time electronic capture of mugshots as well as the electronic conversion of photographic images. For conversion of legacy files of photographs, most of the provisions of this recommendation are also still applicable. In the future, it should be possible to add additional specifications without contradicting any of the current contents of the recommendation.

### **POSE**

The full-face or frontal pose is the most commonly used pose in photo lineups and shall always be captured. This pose is in addition to profiles or intermediate angled poses captured to acquire perspective and other information. For subjects who normally wear eyeglasses, a frontal mugshot image should be captured of the subject without glasses. This is required due to the glare from external illumination. An additional image can optionally be captured of the subject wearing eyeglasses.

### **DEPTH OF FIELD**

The subject's captured facial image shall always be in focus from the nose to the ears. Although this may result in the background behind the subject being out of focus, it is not a problem. For optimum quality of the captured mugshot, the f-stop of the lens should be set at two f-stops below the maximum aperture opening when possible.

## **CENTERING**

The facial image being captured (full-face pose) shall be positioned to satisfy all of the following conditions:

- The approximate horizontal mid-points of the mouth and of the bridge of the nose shall lie on an imaginary vertical straight line positioned at the horizontal center of the image.
- An imaginary horizontal line through the center of the subject's eyes shall be located at approximately the 55% point of the vertical distance up from the bottom edge of the captured image.
- The width of the subject's head shall occupy approximately 50% of the width of the captured image. This width shall be the horizontal distance between the mid-points of two imaginary vertical lines. Each imaginary line shall be drawn between the upper and lower lobes of each ear and shall be positioned where the external ear connects to the head.

## **LIGHTING**

Subject illumination shall be accomplished using a minimum of three (3) point balanced illumination. Appropriate diffusion techniques shall also be employed and lights positioned to minimize shadows, and to eliminate hot spots on the facial image. These hot spots usually appear on reflective areas such as cheeks and foreheads. Proper lighting shall contribute to the uniformity of illumination of the background described in the exposure requirement.

## **BACKGROUND**

The subject whose image is being captured shall be positioned in front of a background which is 18% gray with a plain smooth flat surface. A Kodak or other neutral gray card or densitometer shall be used to verify this 18% gray reflectance requirement.

## **EXPOSURE**

The exposure shall be keyed to the background. Several areas of the recorded 18% gray background shall be used to verify the proper exposure. The averages of the 8-bit Red, Green, and Blue (RGB) components within each area shall be calculated. Each of the RGB means shall fall between 105 and 125 with a standard deviation of plus or minus 10. Furthermore, for every area examined, the maximum difference between the means of any two of the RGB components shall not exceed 10.

## **ASPECT RATIO**

The Width: Height aspect ratio of the captured image shall be 1:1.25.

## **MINIMUM NUMBER OF PIXELS**

The minimum number of pixels in an electronic digital image shall be 480 pixels in the horizontal direction by 600 pixels in the vertical direction. It should be noted that the image quality of the captured mugshots and facial images will be improved as the number of

pixels in both directions are increased. However, as images are captured with an increased number of pixels, the 1:1.25 (Width: Height) aspect ratio will be maintained.

Two considerations must be noted regarding this aspect of the recommendation. First, the normal orientation of many available cameras is the landscape format which specifies a greater number of pixels in the horizontal than in the vertical direction. Unless these cameras capture at least 600 pixels in the vertical direction, it may be necessary to rotate the camera 90 degrees. Second, the 480x600 capture format exceeds the VGA display format of 640x480. Therefore, at a minimum, an SVGA specification of 800x600 pixels will be required to display the facial image. The image will occupy less than the total number of available horizontal pixels.

## **COLORSPACE**

Captured electronic color facial images are required. Digital images shall be represented as 24-bit RGB pixels. For every pixel, eight (8) bits will be used to represent each of the Red, Green, and Blue components. The RGB colorspace is the basis for other colorspace including the Y, Cb, Cr and YUV. Additional color management techniques are available from the International Color Consortium. Information regarding these techniques can be downloaded from the following URL: [www.color.org](http://www.color.org)

## **PIXEL ASPECT RATIO**

Digital cameras and scanners used to capture facial images shall use square pixels with a pixel aspect ratio of 1:1.

## **COMPRESSION ALGORITHM**

The algorithm used to compress mugshot and facial images shall conform to the JPEG Sequential Baseline mode of operation as described in the specification approved by the ANSI X3L3 Standards committee. The target size for a JPEG compressed color mugshot image file shall be 25,000 to 45,000 bytes.

## **FILE FORMAT**

The JPEG File Interchange Format (JFIF) shall contain the JPEG compressed image data. The JFIF file shall then be part of the transaction file for interchange which conforms to the requirements as contained in ANSI/NIST-CSL 1-1993 and ANSI/NIST-ITL 1a-1997.

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Created May 22, 1996.

Last modified April 9, 2003.

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