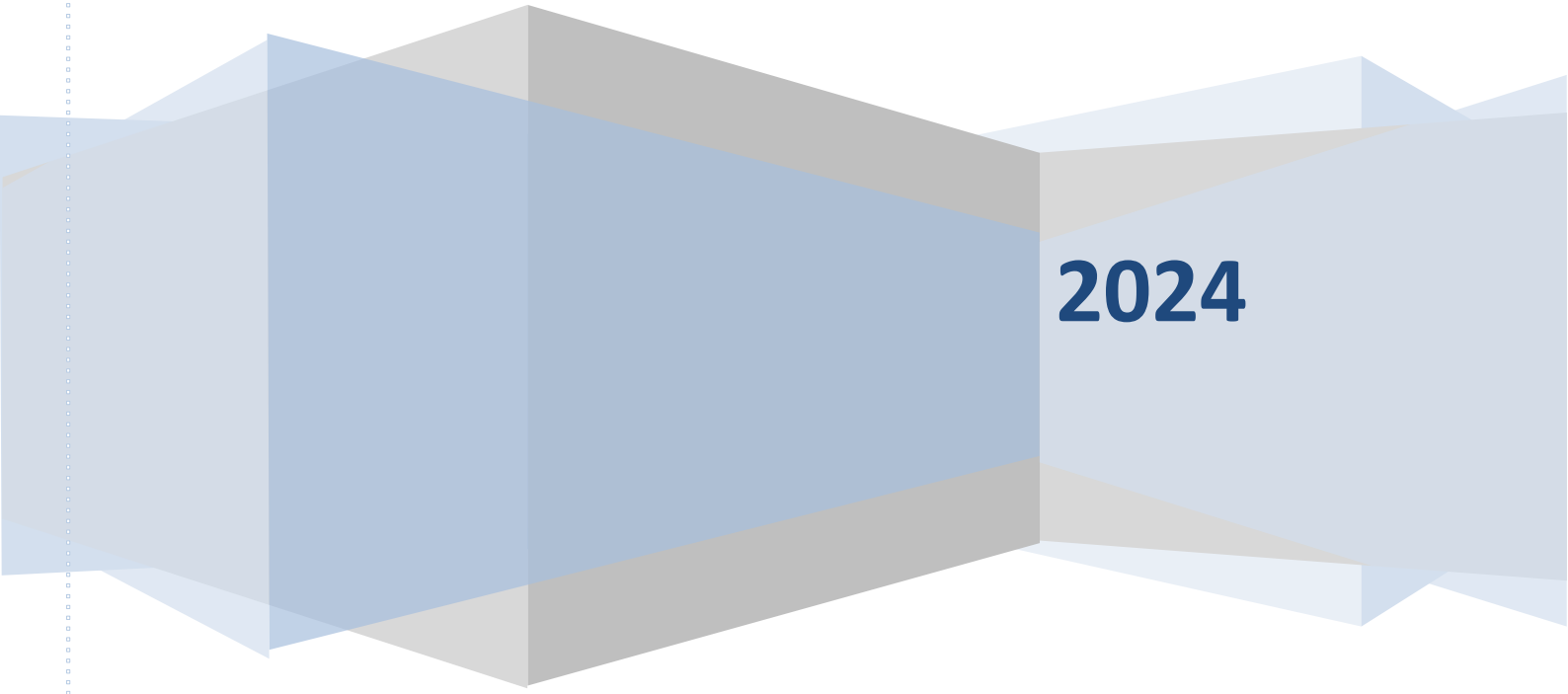
Guidelines concerning Fingerprint Transmission



2024

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GUIDELINES FOR FINGERPRINTS TRANSMISSION

Purpose of this guideline

This document has been prepared to assist Member Countries improve the quality and quantity of fingerprint records submitted to INTERPOL AFIS (Automated Fingerprint Identification System) service for search and storage.

- Fingerprints play an important role in identifying criminals, fugitives, terrorists and indeed victims following a disaster such as a cyclone, earthquake, bombing or other attack.

- Finger marks can be collected at a crime scene and have the potential to link a series of crimes together, or to place a suspect at the scene. Submission of finger marks to INTERPOL will be addressed in a separate document.

- The quantity and quality of information stored in the INTERPOL AFIS (which is part of the INTERPOL Multi Biometric Identification System; MBIS) depends on its Member Countries.

- It is essential that Member Countries contribute to the data inserted in the INTERPOL database to optimize the potential to generate matches for the benefit of everyone. Quality is also an important aspect both when taking the fingerprints and when converting them into an electronic format. If Member Countries send low quality fingerprint data, then searches may not be possible.

In summary - increased quantity and quality of fingerprint data will result in more HITS.

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1. HISTORY OF THE TRANSMISSION OF FINGERPRINTS IN NIST FORMAT IN INTERPOL

1997

In 1997 INTERPOL created an implementation of the NIST standard – defining the file format used for the electronic exchange of fingerprint files for AFIS (Automated Fingerprint Identification System); this standard was agreed by all member countries and is now accepted by the fingerprint world as the standard for fingerprint exchange.

2005

At the beginning of 2005 INTERPOL decided to make fingerprints available in NIST format for all Notices. This means that all member countries connected to I-24/7 from that moment had the possibility to download fingerprint files in NIST format through eASF (electronic Automated Search Facility). These files can only be opened by using a NIST viewer.

2013-2022

INTERPOL AFIS Gateway project allowed member countries to access remotely the INTERPOL central AFIS and run searches of fingerprints and latent prints against all data stored in the fingerprint database at IPSG in Lyon.
No "lights out" process was implemented at that time, which meant that in case of a HIT the result was always validated by two fingerprint examiners at IPSG.

2023

In 2023 the AFIS became part of **MBIS** (Multi Biometric Identification System), together with INTERPOL Facial Recognition System (IFRS). The MBIS utilizes state of the art matching algorithms provided by IDEMIA, INTERPOL's Biometric partner and one of the leaders on the market.

Upon the introduction of MBIS, the **Biometric Hub** (which replaced AFIS gateway) was launched to allow authorized users to submit "search only" fingerprint requests against INTERPOL fingerprint database. Lights out automated responses in near real time are supported, as well as 'human in the loop' where potential HITs are validated by two fingerprint examiners.

The Biometric Hub can also be used to view and edit NIST files.

2. INTERPOL IMPLEMENTATION OF THE NIST STANDARD

2.1 Fingerprints can be taken with an electronic scanning device or manually, using ink and paper. A scanner is then used to save the data electronically in the appropriate format. Records are saved and exchanged in the format set by the National Institute of Standards and Technology (NIST).

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2.2 INTERPOL publishes a technical document with implementation guidelines for the exchange of biometric data in line with this format[1].

2.3 The latest version (v. 6.0), published in 2020, introduces the use of XML. Currently both the binary (Version 5.3) and XML (Version 6.0) remain acceptable.

2.4 Sending fingerprints in NIST format has many advantages; fingerprints can be inserted directly to the AFIS system, the files are smaller in size, contain more information in better quality and thus simplify the biometric data exchange between participating parties.

2.5 The parameters for creating the NIST file required are available on the Fingerprint web page of the INTERPOL web site[2]. If countries are not sure about the compatibility of their NIST files, authorized users can submit the file (no operational data) on the Biometric Hub LEARNING platform. If you do not have access to the Biometric Hub, a NIST file may be sent to biometrichub@interpol.int for testing.

2.6 To facilitate the transfer of fingerprint data, INTERPOL has made a tool available to member countries which converts JPEG files into NIST files (Image2NIST).

3 TRANSMISSION OF FINGERPRINT IN JPEG FORMAT (if not possible in NIST format)

** Since October 2023 INTERPOL ceased to process fingerprints provided in formats other than NIST. In very exceptional cases, when the NIST format is not available and the countries are unable to use one of the tools provided to convert fingerprint image files to NIST files by themselves, we can assist to convert fingerprint to the NIST format.*

3.1 There are general quality requirement for fingerprints which are scanned from a paper fingerprint form.

Fingerprints in JPEG format must meet the following parameters:

- 1:1 ratio (not be enlarged or reduced before or during scanning)
- Minimum of 500 DPI using JPEG compression 8 Bits per pixel (grayscale) resolution

Although not mandatory, it is recommended that a visible scale is attached as part of fingerprint form.

3.2 Sending fingerprints in JPEG format has disadvantages when compared to the NIST format:

- Manual processing is required to convert the JPEG file to NIST format and this will delay the result of the search being sent to the Member Country

[1] INTERPOL Implementation NIST Standard V5.3
INTERPOL Implementation NIST standard V6
[2] https://www.interpol.int/en/How-we-work/Forensics/Fingerprints

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- High quality images of the correct size and resolution in JPEG format are often larger than NIST files, which may limit transmission and sharing of data.

4 WHAT TO SEND

4.1 INTERPOL maintains a database of fingerprint records associated to Notices, Diffusions and I-Link messages from its Member Countries.

4.2 It is recommended that Member Countries create Notices, Diffusions or I-Link messages with biometric data (fingerprints, facial images and DNA) of persons of interest, whether wanted criminal, subject of interest, missing or deceased persons, in cases where there in a trans-national element. Fingerprint biometric data associated with Notices, Diffusions or I-Link messages is automatically searched and stored in INTERPOL databases.

4.3 Member Countries can submit Search Only requests via the Biometric Hub. NCBs are actively encouraged to extend access to the Biometric Hub to relevant law enforcement agencies (for example forensic institutes, border and immigration services). Agencies can then submit search only requests directly against the INTERPOL fingerprint database. Further developing a system-to-system connection to the Biometric Hub supports the systematic searching of fingerprints.

4.4 Use cases for system-to-system connection include; national systems where searches launched are automatically sent to INTERPOL for searching, or border control for searching the fingerprints of persons crossing borders.

4.5 Where necessary and in line with INTERPOL's Rules on the Processing of Data, NCBs may also download and forward fingerprints in the INST format from INTERPOL Notices, Diffusions or I-Link messages to their national AFIS services to be searched against their national collection.

5 CONCLUSION

We hope this short paper will assist you in your daily duties and we look forward to being able to assist you in improving the transmission of fingerprint files. If your fingerprint services need information regarding the exchange of NIST files please ask them to contact us at fingerprints@interpol.int

We look forward to receiving more good quality fingerprints and in return giving you more positive information concerning your fingerprint transmissions.

6 CONTACT

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Attachments: Appendix I. Quality of fingeprint image - clarity
Appendix II. Quality of fingerprint image – resolution
Appendix III. Good quality fingerprint image

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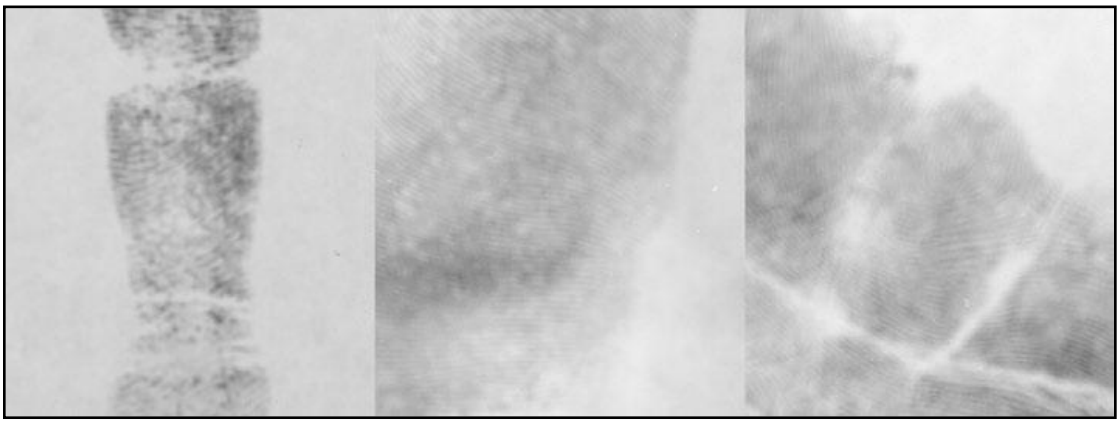
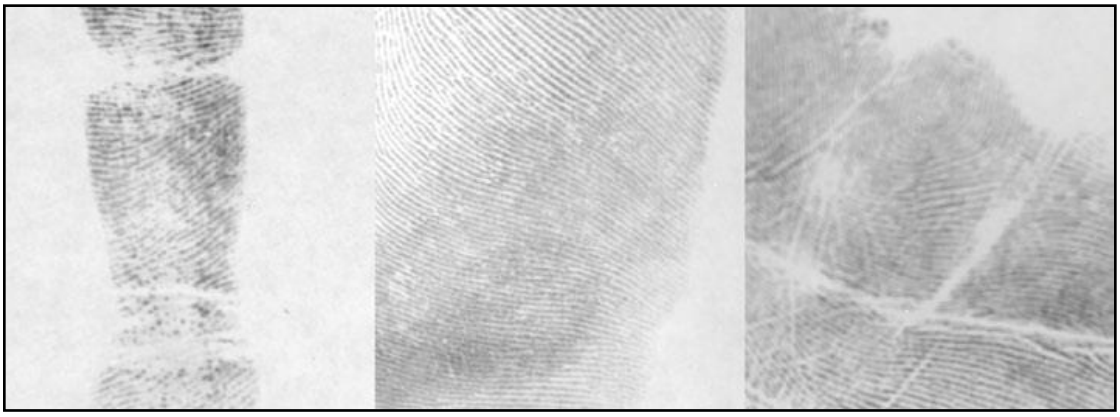
Appendix I.

Quality of fingerprint image
Clarity



A. Only general ridge flow is visible – **WRONG** QUALITY OF IMAGE



B. First and second level details are visible - **WRONG** QUALITY OF IMAGE

C. First, second and third level details are visible – **GOOD** QUALITY OF IMAGE *

* Images from: The Fingerprint Sourcebook, by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al., August 2011,
Chapter 9: Examination methodology, by John V. Vanderkolk

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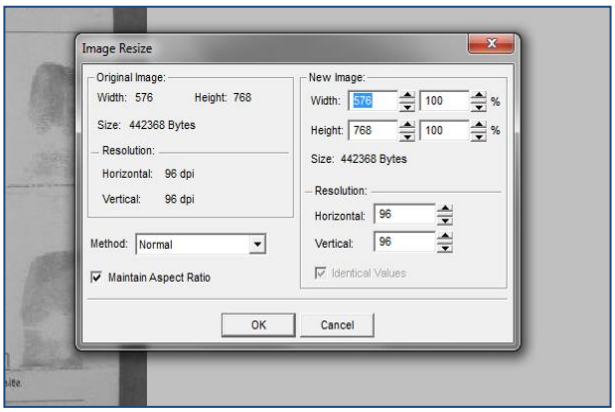
Appendix II.

Quality of fingerprint image

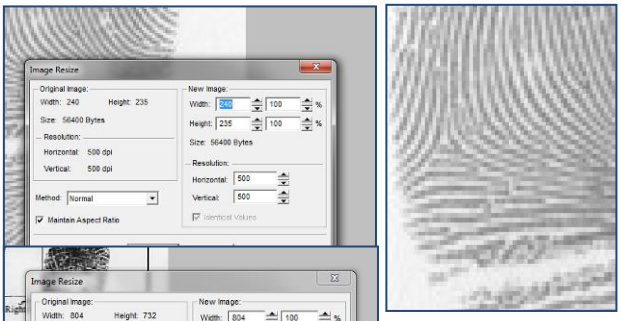
Resolution and size of fingerprint image

A. Wrong DPI – 96 DPI and image reduced in size; see the width and height of the image in Image → Resize option in Menu of Image Viewer

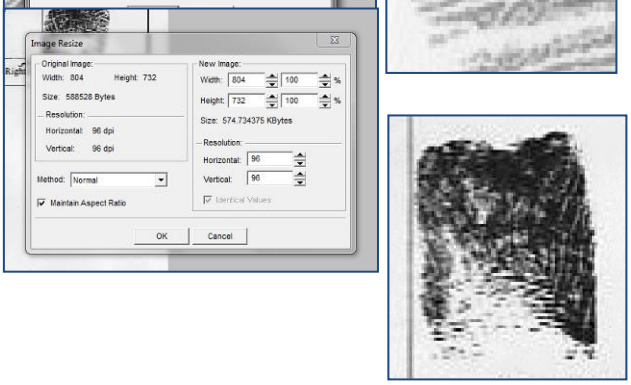


B. Wrong image transmission – photography of fingerprint form taken by camera

C. DPI correct (500 DPI) but image reduced in size – 240 x 235 (W x H). Visible pixilation of image



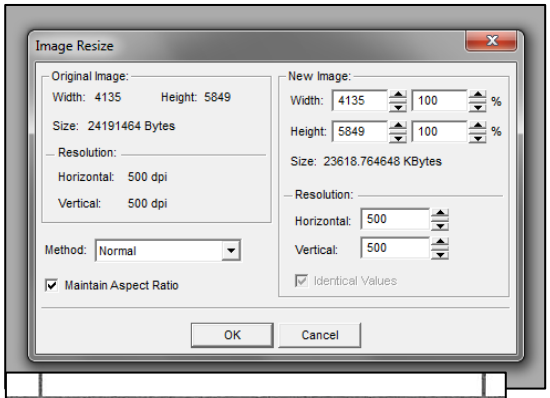
D. Wrong DPI (96 DPI) and image reduced in size – 804 x 732
(W x H)

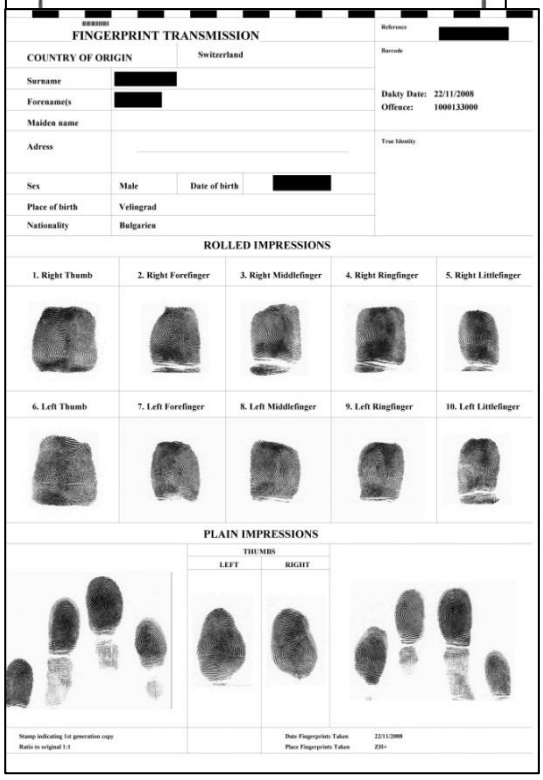


Appendix III.

Good quality fingerprint image

A. Resolution : 500 DPI
B. Dimensions : 4135 x 5849 (W x H)



C. All details necessary for fingerprint examination clearly visible

D. Proper fingerprint form
- scale visible
- all information available
- correct position of fingers