AFIS/APIS PAPILLON

end-to-end solutions for constructing full-scale systems of biometric identification and improving operating efficiency of automated fingerprint and palmprint files

PAPILLON SYSTEMS

PAPILLON AFIS
Automated Fingerprint Identification System

PAPILLON AFIS enables creating, storing and functioning of electronic databases of tenprints and latent records, and automates the process of fingerprint and palmprint identification helping to solve a wide range of tasks: ● **Identification by fingerprints and palmprints, including latent ones, as well as identification by a single print when performing in-the-field identity checks in real-time mode** ● **Identification of the unknown dead** ● **ascertainment of implication in past crimes** ● **linking of crimes committed by one and the same person.**

The PAPILLON AFIS is being widely deployed throughout the Russian Federation for automation of fingerprint and palmprint collections, including criminal, under the Law "Of National Fingerprint Enrollment". At the heart of all the biggest in Russia automated fingerprint data banks of federal, interregional and regional levels is the PAPILLON AFIS. Virtually all of the fingerprint and palmprint paper files amassed in the country have been converted to electronic format of PAPILLON. Such an extensive automation is yielding tangible results. Thus only over the period of its intensive implementation from 2002 to 2009, the AFISs deployed in forensic analysis branches of the Russian Ministry of the Interior helped to expose subjects likely involved in committing about 500,000 crimes.

Remote Access to PAPILLON AFIS Resources

On-line remote access to the AFIS databases enables qualitatively new and higher utilization level of the fingerprint files' informational potential allowing any identification task to be reliably solved.

The PAPILLON's technologies provide automated remote access to the AFIS databases' capabilities for replenishing data arrays and for carrying out all types of searches and identity checks as well.

Geographically-distributed multi-level AFISs realize the following construction principle on every level: Central AFIS (CAFIS) + network of remote workstations. The IP telephony channels, including wireless, are used to link remote workstations with the CAFIS.

Types of PAPILLON Remote Workstations

1. PAPILLON LIVE SCANNER Station for Electronic Fingerprinting

   Functions: Creating forensic quality tenprint cards (with palmprints included) and transmitting them to the CAFIS.

2. Remote Access and Processing Station

   Functions: Input and processing (all operations including coding) of tenprint cards and latents, data transmission to the CAFIS, viewing of candidate lists, access to the CAFIS database information.

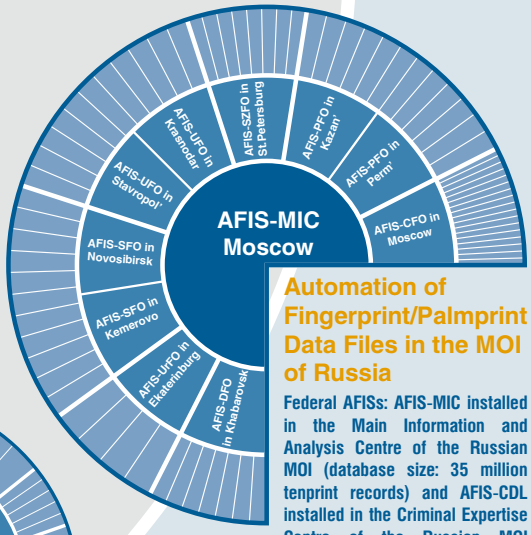
3. PAPILLON FILTER Station for Express ID Checking

   Function: Identification by touch fingerprints against the CAFIS database in real-time mode.

Any two or all of these three variants of remote workstations can be combined in a single system provided that it is equipped with all necessary hardware.

Customers of PAPILLON AFIS in RUSSIA

● Ministry of the Interior of Russia ● Federal Migration Service ● Ministry of Defense ● Main Office for Passport and Visa Issuing ● Ministry of Justice ● Federal Service of Judgement Enforcement ● Federal Security Service ● Federal Drug Control Service



Automation of Fingerprint/Palmprint Data Files in the MOI of Russia

Federal AFISs: AFIS-MIC installed in the Main Information and Analysis Centre of the Russian MOI (database size: 35 million tenprint records) and AFIS-CDL installed in the Criminal Expertise Centre of the Russian MOI (database size: 60 thousand latent print records)

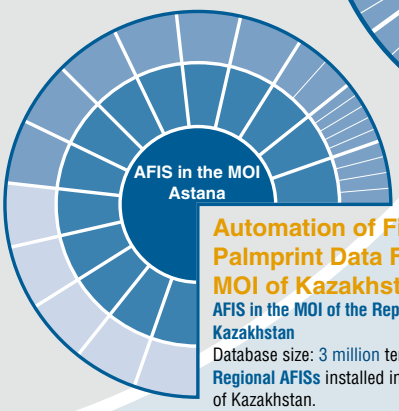
Interregional AFISs installed in all federal districts of Russia.

Total database size (all 10 AFISs-FO): 55 million tenprint records, 1,3 million latent fingerprint and 150 thousand latent palmprint records.

144 remote AFIS stations are in operation within the AFISs-FO.

Regional AFISs, 70 AFIS-R and 712 remote AFIS stations are in operation.

Total database size: 48 million tenprint records, 2 million latent fingerprint and 400 thousand latent palmprint records.



Automation of Fingerprint/ Palmprint Data Files in the MOI of Kazakhstan

AFIS in the MOI of the Republic of Kazakhstan

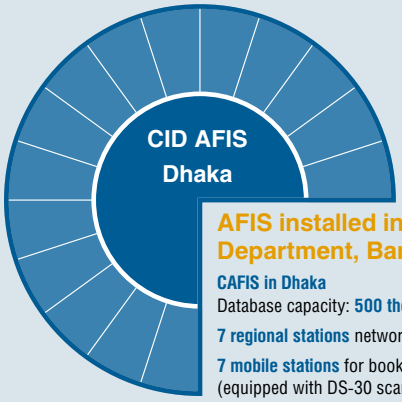
Database size: 3 million tenprint records.

Regional AFISs installed in all 14 regions of Kazakhstan.

17 remote stations in some regions

15 stations for remote access and fingerprinting

2 mobile stations PAPILLON-M



AFIS installed in Criminal Investigation Department, Bangladesh Police

CAFIS in Dhaka

Database capacity: **500 thousand tenprint records**

7 regional stations networked with the CAFIS

7 mobile stations for booking and express ID checking (equipped with DS-30 scanners)

Factors contributing to high efficiency of PAPILLON AFIS

Topological Approach to Describing Fingerprint Patterns

PAPILLON AFIS uses ridge counts and ridgewise relations as topological characteristics to describe positional and directional relationships between neighbouring minutiae along and across the ridge flow. This approach enables higher matching selectivity in comparison to those systems that describe only the position and direction of minutiae. The result is shorter candidate lists with true candidates on first place.

Automatic Feature Extraction

High-accuracy algorithm of pattern recognition ensures the system immunity to typical distortions of input information and minimizes the human factor when entering fingerprint or palmprint data into the system. Tenprints data are coded automatically, while the process of latent print encoding is semi-automatic – the extent of operator's interference depends upon the latent print quality.

Scale-Independent Matcher

Unknown scale of finger or palm prints does not handicap PAPILLON AFIS when matching them. Owing to PAPILLON's patented technology AutoScaling based on ridge counts, all images saved into the database are brought to a uniform scale. Thus, the system show equal reliability when operating with images of 1:1 scale as well as with those photographed in unknown scale or undergoing any scale changes – age-related, postmortem, etc.

Palmprints Analysis

The PAPILLON AFIS/APIS is capable of processing, encoding and recognizing palmprints, including latent, as accurately and reliably as it does when operating with fingerprints. At PAPILLON, palmprints are processed and encoded automatically for matching. Experience gained by the Russian MOI's agencies, who went over from a 'fingerprint' to 'palmprint' version of PAPILLON AFIS as far back as 1998, evidences that the efficiency of automated finger and palm print record collections is 20-23% higher. The processing of palmprint images acquired from tenprints is completely automatic. The scenario of coding latent palmprints is similar to that of latent fingerprints.

Support of Any-volume Databases

Owing to its modular design, every PAPILLON system is built to cater exclusively for specific requirements and preferences: from a small-scale standalone workstation to large systems with a database capacity from tens of thousands to hundreds of millions of tenprint records, still ensuring high accuracy and reliability of performance. Incorporating the distributed computing technology, PAPILLON's engineers use ad hoc multiprocessor matchers to operate with ridge pattern codes and to adapt the system to any database capacity.

417 matchers based on IBM's servers (834 processors) are in operation in the largest of Russian fingerprint-palmprint data banks, automated by PAPILLON's technologies and containing over 400 million finger and palm print records. Peak performance of a matching unit is ~6,000 gigaflops.

The problem of storing voluminous fingerprint/palmprint image data is solved in PAPILLON AFIS/APIS by compressing fingerprint/palmprint images with FBI-certified algorithms for WSQ compression. Image data are stored on platters in libraries (MemBox) with copmplete duplicates of full database segments.

High-availability Technology

High availability is provided by the hot-swapping capability allowing to replace faulty equipment without interrupting the system operation. Parallel computing, cluster architecture of the database server, use of the RAID disk-arrays and full mirror backup of the information stored in the database ensure high fault-tolerance of the system, i.e. enable the system to operate efficiently even if one of its components is disabled.

High-quality Image Entry

Higher quality of incoming finger and palm print data allows the AFIS to achieve higher hit rates while reducing the number of candidates on lists of potential mates. To improve the quality of data arrays, PAPILLON has designed and implemented the advanced technologies for data entry: electronic fingerprinting and transmission of electronic tenprints to AFIS (LIVE SCANNER system) and video input of latent prints using PAPILLON's high-resolution camera TVC-9.1.

Bulk Input Technology

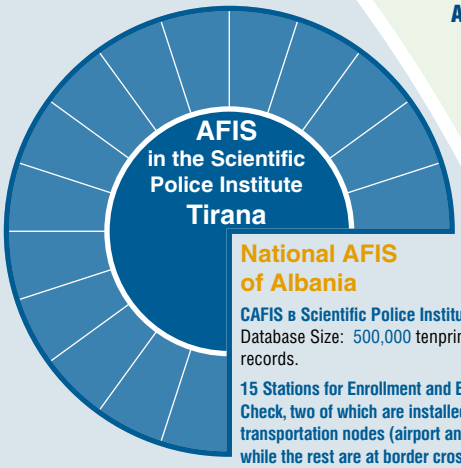
PAPILLON has developed a new method of rapid conversion of paper fingerprint/palmprint files accumulated at law-enforcement repositories into the PAPILLON AFIS/APIS format, thereby creating an electronic database. It is the so-called Bulk Input technology allowing the input of 1 million tenprint cards per month. Stream scanning of tenprint cards is carried out by means of PAPILLON high-speed scanners providing the daily performance of 3,000 tenprints.

Data Exchange

PAPILLON AFIS/APIS meets the ANSI-NIST format requirements for transmitting data and exchanging fingerprint/palmprint information. Three versions of this format are supported in the PAPILLON system: FBI (EFTS), Interpol (INT-I) and MOI of Russia (RUS-I).

Remote Access to AFIS

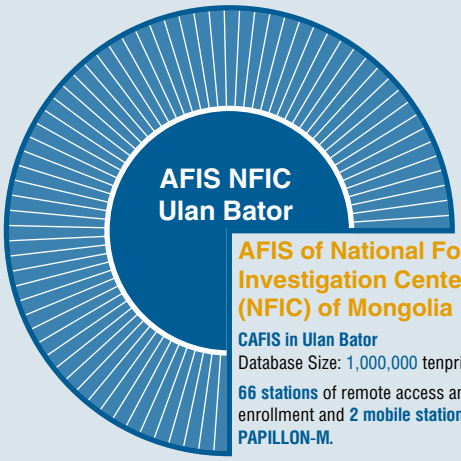
Remote workstations are capable of functioning as full-featured AFIS/APIS workstations within regional-level systems. They communicate with central sites via any communication channel providing IP-connection.



National AFIS of Albania

CAFIS в Scientific Police Institute
Database Size: 500,000 tenprint records.

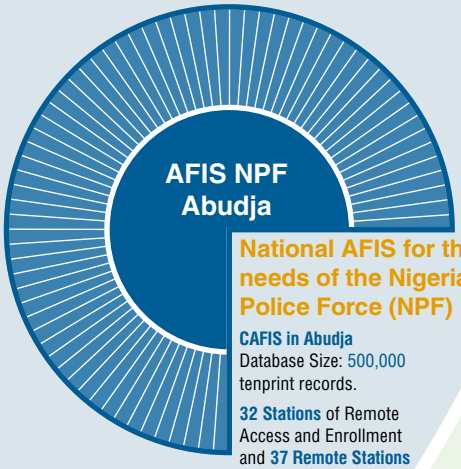
15 Stations for Enrollment and Express ID Check, two of which are installed in the largest transportation nodes (airport and seaport) while the rest are at border crossing points, communicated with CAFIS via dedicated departmental channels.



AFIS of National Forensic Investigation Center (NFIC) of Mongolia

CAFIS in Ulan Bator
Database Size: 1,000,000 tenprint records.

66 stations of remote access and enrollment and **2 mobile stations of PAPILLON-M.**



National AFIS for the needs of the Nigeria Police Force (NPF)

CAFIS in Abudja
Database Size: 500,000 tenprint records.

32 Stations of Remote Access and Enrollment and **37 Remote Stations** to collect fingerprint data.

PAPILLON LIVE SCANNER Station for Electronic Fingerprinting

The PAPILLON LIVE SCANNER system is a complete booking-to-identification solution that enables:

- high-quality electronic tenprint cards that include alphanumeric descriptive information, fingerprint and palmprint images (10 rolled fingerprints, plain impressions of fingers and palms (with DS-45/45M scanner)), mugshots and SMT photos, verbal physical description
- printing hard copies of tenprints in specified formats
- creation of local tenprint databases
- on-line identification by touch prints against local databases
- on-line identification by demographic data against local databases

System Components:

Personal Computer
PAPILLON Scanner DS-45 (DS-45M, DS-30N or DS-30NM)
Digital Camera with Tripod
Laser Printer
Modem
PAPILLON LIVE SCANNER Software
Operating System: Linux or Windows

Mobile PAPILLON LIVE SCANNER Station for Electronic Fingerprinting with PAPILLON DS-30 fingerprint scanner

- transmission of electronic tenprint cards to the Central or any other AFIS in ANSI/NIST format (format versions: INT-I, EFTS, RUS-I) through IP communication channels

PAPILLON DS-45 is certified by USA FBI (February 2010). The quality of fingerprint images acquired in the LIVE SCANNER system ensures pinpoint accuracy of automatic recognition and encoding of impressions in the AFIS, thereby improving its key search characteristics (accuracy, selectivity and processing speed).

- Elastic covering of the scanner platen enables acquisition of high-quality images even of those fingers which are hardly feasible for taking impressions (too dry, with flat-relief or worn-down patterns (so-called “housewife’s fingers”), etc.).
- PAPILLON’s smear-compensation algorithm almost completely eliminates image imperfections that appear through unavoidable slipping of the finger on the scanner platen when rolling.
- Moisture-discriminating optics generates superior quality images of rolls and slaps, that are not obscured by moisture, and negates errors (gray halos around impressions) caused by weeping glass of the platen.

The LIVE SCANNER system interface guides users through step by step making the fingerprinting process easy to perform:

- automatic start of scanning as soon as the finger/fingers/palm is detected within the sensing area
- live video of the scanned finger helps the user place and guide the fingers correctly
- automatic slap-to-roll sequence control ensures that each finger is in its correct location (the system notifies of errors in sequence and if fingers of another subject have been rolled)
- image quality assurance
- automatic switch to the next finger if the image quality of the previous one is good.

PAPILLON REMOTE SITES

Station of Remote Access to Central AFIS

Remote Access workstation is capable of functioning as an AFIS operator terminal enabling successful performance of the following tasks:

- Entry of tenprint cards (scanning with a flatbed scanner) and latents (video input or scanning with a flatbed scanner)
- Entry of photos
- Encoding of tenprint and latent images
- Creation of a local database containing tenprint and latent records
- Maintenance of the local database
- Transmission of tenprint and latent data to the CAFIS for matching and filing via communication channels supporting IP connectivity
- Reception of search results
- Work with information stored in the CAFIS database

The CAFIS administrator assigns a well-defined set of permissions for every remote workstation contemplating access to the Central AFIS site database.

System Components:

Personal Computer
Flatbed Scanner
Latent Video Input Kit with PAPILLON TVC-9.1
High-Resolution Camera (or Digital Camera)
Laser Printer
Modem
PAPILLON AFIS Software
Operating System: Linux

PAPILLON FILTER System of Express ID Checking

PAPILLON can offer a range of solutions to perform remote identity checks by comparing the subject's touch fingerprints against the fileprints stored in the PAPILLON AFIS databases:

Permanent Workstation

Personal Computer, Modem
PAPILLON DS-21 or PAPILLON DS-22N (DS-30N (NM), DS-45(M) to create electronic tenprint cards)
PAPILLON FILTER Software,
Operating System: Linux or Windows

Mobile Workstation

Notebook with GSM-modem built-in
PAPILLON DS-21 or PAPILLON DS-22N
PAPILLON FILTER Software
Operating System: Linux or Windows

PAPILLON DPP-3 Handheld Terminal

Optical scanner integrated with a cellphone

Steps of Remote Express ID Checking against the AFIS Database:

1. Image acquisition of any two fingers
2. Automatic transmission to CAFIS
3. First-priority searches against the CAFIS database
4. Automatic extraction of passport data and mugshots (if any) from all tenprints found
5. Automatic transmission of results to the requestor

Operating Data: average time to verify the identity of the a subject against the AFIS database containing about 7 million tenprint records is approx 40 seconds if using high-speed channels of wire communication, and up to 1,5-2 minutes if using wireless communication.

High rate and complete automation of the verification process and availability of mobile solutions as well, enable the PAPILLON FILTER system to be used anywhere that prompt identification or verification is needed, thereby maximizing the AFIS productivity.

PAPILLON REMOTE SITES

PAPILLON-M Mobile Versatile Complex

PAPILLON-M mobile versatile complex is capable of functioning as an enrollment station for electronic fingerprinting, as a terminal of remote access to the Central AFIS resources and as an express ID checking workstation, integrating the functional capabilities of all the three types of PAPILLON remote stations.

Moreover, the PAPILLON RASTR software installed in the system allows experts to quickly fix and process images, to compare images in a split-screen format, to prepare examination reports and work sheets, and then to print them as hard copies. The ad hoc filters available in RASTR allow the poor-quality latent images (obscured by dirt, or containing overlaying latents) to be enhanced before they are dispatched for identification.

PAPILLON-M provides on-the-spot access to PAPILLON AFIS databases through any wire communication channel supporting IP connectivity, and through wireless connectivity as well whether it be GSM or CDMA. The Inmarsat RBGAN synchronized satellite channel can also be used for data transmission.

The workstation is mounted in a rugged and shockproof case-container. It takes not more than 2 minutes to prepare the station for service after transportation.

The workstation is adapted for use in a vehicle: it can be energized from the car accumulator via voltage inverter or from the on-board power supply system. For lack of external power supply, the workstation devices can efficiently operate being battery-powered.

PAPILLON-M Components:

Notebook (supplied with charger, battery pack, embedded GPRS modem, voltage inverter)

Portable Flatbed Scanner

PAPILLON DS-30 Livescan Fingerprint Device

Digital Camera

PAPILLON Camera-and-object Holder

Portable Printer

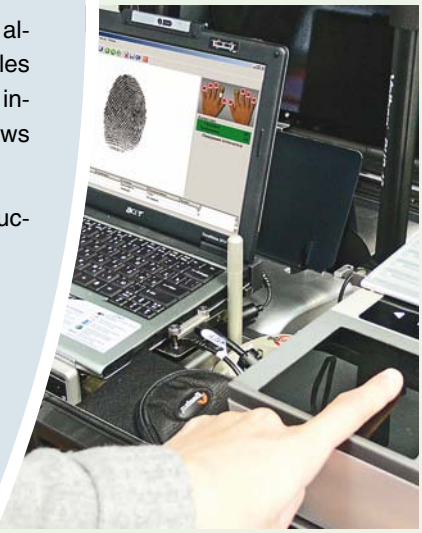
Case-container

Application Software: PAPILLON AFIS, PAPILLON LIVE SCANNER, PAPILLON FILTER, PAPILLON RASTR

Operating System: Linux and Windows

Besides fingerprint data, the workstation allows for transmission to the CAFIS of files containing any alphanumeric and graphic information originated in the Linux or Windows operating systems.

350 workstations of PAPILLON-M are successfully operating in Russia.



Pictures:

In-the-field identity checks using the PAPILLON-M workstation

Federal Migration Service vans equipped with the PAPILON-M workstations (Republic of Tatarstan)

PAPILLON REMOTE SITES

Multifunction Livescan Station PAPILLON MDS 40c

Papillon MDS 40c is designed to capture a subject's fingerprints and palmprints without the use of ink and to provide remote collaboration with a central AFIS enabling transmission of the acquired data and initiation of searches against the AFIS databases (including automatic identity checks by a fingerprint in real-time mode).

Remote communication with the AFIS is available through IP-connection via cellular channels (data are transferred in GSM/GPRS/EDGE format) or via stationary channels, or using a Local Area Network (LAN).

The housing of the station is designed as a ruggedized compact cabinet. The hardware components are securely fixed in this rugged kiosk. Most of the equipment (computer, printer, uninterruptible power supply unit, and flatbed scanner (if any)) is mounted within the kiosk and can be easily accessed, in case of need, due to some proprietary design solutions.

The integrated fingerprint and palmprint scanner is embedded in the top deck of the kiosk, while the LCD display and the digital camera are installed in its flap cover. On the left side of the cabinet, there is a drop table. The cabinet is covered with powder enamel that is highly resistant to galling.

Designed as a cabinet, the Papillon MDS 40c requires no special room inaccessible for unauthorized persons. While not in use, the cabinet is closed (the equipment can remain on at that) becoming a "thing in itself", protected from unauthorized access and vandals, which allows this standalone to be used under all environmental conditions, even in crowded passage-ways, police call centers, etc.

The PAPILLON MDS 40c is available in two different versions differing in some components of the fitted equipment and software package.

In its standard configuration, the PAPILLON MDS 40c station is a complete booking-to-identification solution capable of performing electronic fingerprinting of apprehended or suspected persons or people of other categories, transmitting files of generated tenprint cards to the PAPILLON AFIS database, and initiating urgent automated identification search (express ID checks) against the AFIS databases in real-time mode. The system software enables users to acquire fingerprint images by extracting them from plain impressions (slaps captured in a 4+4+2 mode) to create full-information tenprints as it is required in biometric passport projects of some countries.

No fingerprint-expert knowledge is needed to operate the workstation.

PAPILLON MDS 40c Components
(Baseline Model):

PC (workstation computer, LCD display, trackball keyboard), digital camera (option)

Papillon DS-45 fingerprint and palmprint scanner

Laser printer (A4 format)

Uninterruptible power supply and adapter

GPRS modem and/or external modem (subject to communication used)

Application Software:
PAPILLON LIVE SCANNER,
PAPILLON FILTER

Operating System: Linux or Windows

PAPILLON AFIS APPLICATIONS

Transportation security (spot ID checks at airports, railway stations, river and sea ports, the underground)

Industrial security and protection of other high-security facilities or natural persons

Physical access control

Databases of migration control and registration of non-residents including stateless persons

Border control, governing of the entry, stay and departure of foreign nationals

International criminal tracking

Biometric document registration database

Document fraud control: biometrical document authentication

PAPILLON AFIS

PRODUCT FEATURES AND BENEFITS

Enables creation of tenprint databases allowing them to be divided into sections according to types of enrollment

Enables creation of databases containing latents lifted at crime scenes

Provides ability to import-export tenprint and latent records in ANSI/NIST format

Identifies individuals by their fingerprints and palmprints

Performs real-time ID checks (identification by a single fingerprint)

Enables identification of the unknown dead by using a pattern fragment

Identifies individuals by latent impressions of finger or palm, lifted at crime scenes

Links different crimes by latents detected

Enables the users to deploy distributed systems, to perform remote input of fingerprint/palmprint information and to gain remote access to databases

Ensures interaction with other types of automated files and compatibility with external SQL systems

Voluntary and compulsory registration databases

Identification of victims of terrorist acts, accidents, armed conflicts and natural disasters

Identification of the disabled persons

Databases of persons of welfare

Social security and welfare distribution control

Creation of Criminal Tenprint and Latent Record Databases

Crime Investigation and Suppression of Criminal Acts

PAPILLON SYSTEMS

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