Presentation on National New Generation Automated Fingerprint Identification System (NAFIS) for Police in India

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Bangaluru, Karnataka.

Present Status

At present the AFIS exists at NCRB HQ and 22 other states Headquarters. And 11 more States have yet to install the system. These AFIS have been running standalone with least features to deliver the desired result for tracking criminals in state. The shortcomings of present AFIS have been studied and found as follows:

Most of AFIS are of outdated technology and have proprietary encoding & matching algorithms, which lack commonality & interoperability.

Present Status

None of these AFIS has interstate / inter AFIS connectivity module & functionality and therefore no Data Portability & Interoperability is achieved even amongst various versions of same vendor and AFIS of other vendors.

All AFIS have miserably poor capability to search Latent Print.

No AFIS has capability to store & search palm print and is not complete package of all required core functionalities

NAFIS Challenges

- To set up a uniform AFIS system to cater pan India is a complex and herculean task.

- There are variety of proprietary AFIS systems that are installed at FPB of states and UTs.

- Most of them have proprietary methods of storing Fingerprint and Demographic Data.

- In order to create NCRB as a notional repository of AFIS data, all the different AFIS has to come on same platform .

- So there is strong need to have an standardized FP/Palm as well as demographic Data Format.

- Need to have standardization of query generation so that place of origin is established

NAFIS Challenges

- All the legacy AFIS needs to talk to NCRB NAFIS so that their data is accessible and searchable.

- There is a strong need of a Nation wide AFIS infrastructure at NCRB as well as in all state Headquarters.

- Integrating Pan India deployment of FED so that Demographic data is kept as national repository

- Integration with CAS and local customization

NAFIS Challenges
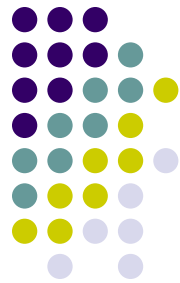
- Interoperability - Data should be interoperable from one state to other and from NCRB to all States and UT`s and vice versa.

- Inter-operatibility between NCRB and INTERPOL, FBI and other international law enforcing agencies etc and Vice-versa.

- Integration of all existing State AFIS with NAFIS.

- Conversion of database from proprietary to NIST format.

NAFIS – Scope of Work

- The NAFIS solution under CCTNS project would be implemented by the solution provider selected through this bid process for implementation of the following scope of work. The AFIS solution can be a COTS product or a bespoke solution or a combination of both.

- Making a national repository of Fingerprint /Palm print/Mug shot/ Criminal attribute database.

- Positive Personal Identification before criminal conviction and during investigations

- Scene of crime finger and palm latent/chance print identification

- Document Cases of disputed Finger Prints

- Facilitate rapid suspect/criminal identification system for mobile devices (MDT)using fingers /face.

- Full functioning Demographic Data Management System (DDMS)

- Provide 1 full State Remote Query Workstation to all the states SCRB head quarters

NAFIS – Scope of Work

- Porting of full Data (Fingerprint /Palm print + Demographic) from all state SCRB AFIS system.

- Perform digitization of all the legacy inked slips

- Integrate the Fingerprint Enrollment Devices (FED) procured by the NCRB.

- Deployment and maintenance of the central datacenter along with DR Site and all the related hardware and third party software.

- Assist NCRB in constant performance enhancement and tuning of the system.

- Customization of NAFIS application software to suit full requirements of NCRB.

- Integrating all the existing state AFIS systems deployed in India with the State Remote Query Workstation provided by NCRB-NAFIS system to facilitate transaction system from legacy systems. The middleware for inter- compatibility between State AFIS and NAFIS has to be provided by NAFIS vendor.

NAFIS – Scope of Work

- Vendor has to provide a Standard API /Middleware/ bridge software so that State Legacy AFIS can be upgraded /integrated with State RQWS NAFIS.

- Vender has to also provide Standard API /Middleware/ bridge software that can be integrated into the existing NCRB AFIS systems for generating the seamless interface with NAFIS

- The tools should also enable bulk record conversion for inserting the existing AFIS transactions into the NCRB NAFIS database.

- The proposed system should also facilitate continual submission of the transactions to the NCRB NAFIS from the states.

NAFIS Solution Overview

Provide the central NAFIS system as per the requirements below

- Fingerprint/ Palm print Enrolment & Encoding Subsystem
- Fingerprint / Palm print Transaction/ Communication Subsystem
- Fingerprint/Palmprint matching –verification Subsystem
- Demographic Data Management System (DDMS)
- Fingerprint/Palmprint Database Storage Subsystem
- Asset Management /Reporting Subsystem
- Requisite Hardware for NAFIS

Compliance with the International Standards
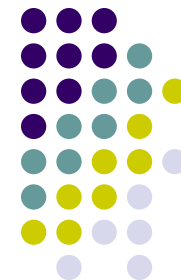
- NIST Compliance to Data Format for the Interchange of Fingerprint, Facial, Iris & other BiometricInformation (ANSI (American National Standards Institute)/NIST-ITL 1-2011).

- JPEG compression for mug-shot images (ANSI/NIST – ITL 1-2011)

- Minutiae and related information encoded from a finger or palm: ANSI/NIST Type-9 (ANSI/NIST–ITL 1-2011)

- Ten-print Processing: 500/1000 ppi ANSI/NIST Type-4 Images (ANSI/NIST–ITL 1-2011)

- Palm Print Processing: 500 ppi/1000 ppi ANSI/NIST Type-15 Images (ANSI/NIST– ITL 1-2011, ANSI/NIST–CSL 1-1993)

- Electronic Fingerprint Transmission Specification (EFTS)

- A certified version of the Wavelet Scalar Quantization (WSQ) algorithm as specified by INAFIS-IC-0110 (V3.1) for lossy compression of fingerprint images scanned and transmitted at 500 ppi

- Finger Image standard as per the ISO/ IEC 19794-4

- Minutiae Image standard as per the ISO/ IEC 19794-2

- Benchmarked in Slap Finger print Segmentation Evaluation (SlapSeg04) by NIST.

- Bidder / Any consortium   member in case of consortium must have participated in NIST ELFT-EFS evaluation program conducted by NIST in 2010 for chance print encoding and FP Data interoperability.
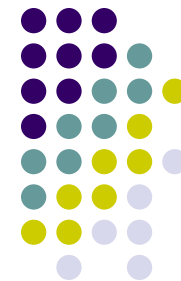
Work Load Specifications for NAFIS

Specification	Units
DATABASE	
Ten digit slip database	1,50,00,000
Upgradability	Up to 5,00,00,000
Single print latent (chance) database	5,00,000
Upgradability	Up to 10,00,000
Palm Print Database	25,00,000
Upgradability	Up to 50,00,000
Palm Print latent (chance) database	1,00,000
Upgradability	Up to 5,00,000
Face (mug shot) Database	1,50,00,000
Upgradability	Up to 5,00,**00,000**
Textual Database	Yes
1. Daily Record and Searches	
Number of record slips	10000
Number of search slips	20000
Number of latent (chance) prints	1000
Number of Palm searches	100

Indicative Layout Diagram:
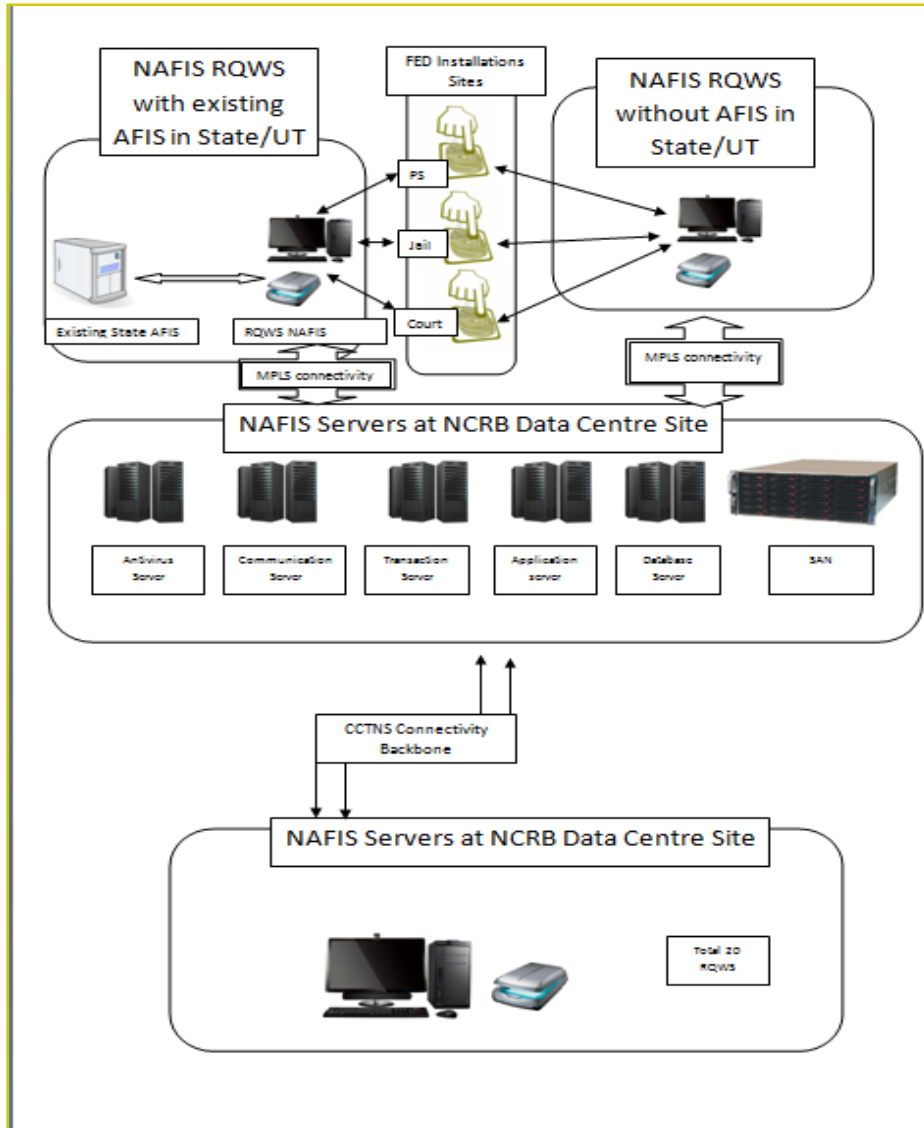
Basic Requirement of NAFIS subsystems

Fingerprint /Palmprint Enrolment & Encoding Subsystem:

- Input Terminals at NCRB : 20 Nos.

- Input Terminals at Remote Query Terminals (RQT)- at all State & UT Headquarters.
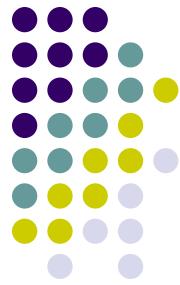
Basic Requirement of NAFIS subsystems

Fingerprint /Palmprint Transaction / Communication Subsystem:

- Web Servers for MDT login and Transaction /communication server - 02 Nos.

Fingerprint /Palmprint Matching/ Verification Subsystem:

- Matcher Server: 06
- Application Server : 02

Basic Requirement of NAFIS subsystems

Fingerprint /Palmprint Database /Storage Subsystem:

- Database Server + Active Directory :04
- Backup Server:01
- Anti-virus Server -01

Asset Management / Reporting Subsystem

- Part of application server

Basic Requirement of NAFIS subsystems

Standard Input Terminal / RQT Setup

- High End Desktop Work Station-01
- Photo Quality Flat bed Scanners:01
- Laser Printer : 01
- 1 UPS 1KVA 1hr backup: 01
- Furniture
  - Computer Table : 01
  - Chair : 01

Central Server Components

- Application server
- Database Server
- Communication Server
- Transaction Server
- Anti-Virus server
- Back-up server
- SAN
- Disaster Recovery Server

Concern for NAFIS

- Interoperability - Data should be interoperable from one state to other and from NCRB to all States and UT`s and vice versa.

- Inter-operatibility between NCRB and INTERPOL, FBI and other international law enforcing agencies etc and Vice-versa.

- Integration of all existing State AFIS with NAFIS.

- Conversion of database from proprietary to NIST format.

- Bridge Software /patch from NAFIS-RQWS to State AFIS so that all state offices can come at uniform level.

- Standardization of Criminal attribute at National Level and customization with the state. (Search /record Slips)

Performance Evaluation Methodology
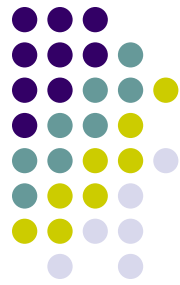
The system will be evaluated based on proposed NAFIS Performance based on the following:

- Biometric Accuracy
- Speed
- Performance
- Integration of various components
- Client Software
- Adoption of Standards
- User Friendly, interactive and intuitive GUI Capabilities.

Performance Evaluation Plan-
Marks Distribution

	Marks Distribution Plan	Weightage	
1	General Functionality	30	
2	Technical Demonstration	70	

S.No.	General Functionalities	Weightage	
		RQT Deployment	Marks
1	Presence of OEM /SI in Law enforcement agencies for Criminal Identification. RQT	<200+	20
		<=175-200	18
		<=150-174	16
		<=125-149	14
		<=100-124	12
		<=75-99	10
		<=50-74	8.0
		<=25- 49	6.0
		Less Than 25	4.0
		0	0
\2	Capacity building and Change Management plan	**02**	
3	Operation and Maintenance capability	02	
4	Educational qualifications, and relevant certifications of Team Member of NAFIS Deployment & Training	02	
5	Hardware Compliance	02	
6	NAFIS Solution compliance to mentioned requirements	02	

MINIMUM MARK FOR THE QUALIFICATION IN THE TECHNICAL EVALUATION IS 70 OUT OF 100 (TECHNICAL SCORE).

Performance Evaluation Plan-
Marks Distribution

2. Technical Functionality
The AFIS solution by the bidder during the POC will be tested on the following parameters

S.No.	Evaluation criteria / sub criteria	% Weightage
1	AFIS Performance (Speed and Accuracy)	20% for Speed 80% for Accuracy
2	Compliance on System Architecture and solution	Q
3	Overall Technical Evaluation Score	100

MINIMUM MARK FOR THE QUALIFICATION IN THE TECHNICAL EVALUATION IS 70 OUT OF 100 (TECHNICAL SCORE).

Evaluation Methodology

<u>Speed for ten print slips</u>

● Time will be recorded from submission of Query to matcher & its appearance in verifier .

● Ten Print Slips: 100% penetration time should be; 1-10 sec -10 Marks;

● 11-20 Sec- 5 Marks ,

● 21-30 Sec -2 Marks,

● 31-40 Sec-1 Marks and

● above 41 Sec- 0 marks.

● *Score per slip   :2 * place of hit/10*

● *Total weightage of 12 slips out of 20 : 20 *total score/120*

● *Lets take this as ="**T1**"*

● **<u>Accuracy for ten print slips: (in a hit list of 20)</u>**

● Ten Digit Finger Print-

   ● 1st Hit- 10 marks

   ● 2nd Hit- 01 Marks

   ● 3rd Hit onward 0 Marks.

● *In case the system is giving 50 hits, then only first 2 his will be considered.*

● *Total Ten prints Slips: 12 Numbers*

● *Total weight-age out of 80 = 80 * total score /120*

● *Lets take this as ="**T2**"*

Evaluation Methodology

Latent Print speed : total 8 latent slip will be provided or accuracy and speed test,

- 1-90 Sec- 10 Marks,
- 91-120 Sec – 8 marks,
- 121 -140 Sec- 5 Marks,
- 141 -150 Sec – 4 Marks,
- 151 Sec Onwards - 3 marks.
- Total weight-age out of 20 = 20* total score/80
- Lets take this as = **"L1"**
- Accuracy : (in a hit list of 20)
- Latent Finger/ Palm Print-
    - 1st Hit- 10 marks
    - 2nd Hit- 09 Marks
    - 3rd Hit – 08 Marks
    - 4th Hit- 07 Marks
    - 5th Hit – 06 Marks
    - 6th Hit – 05 Marks
    - 7th – 10th Hit -04 Marks
    - 11th – 15th Hit – 03 Marks
    - 16th – 19th – 02 Marks
    - 20+ Hit – 0 Marks.
- In case the system is giving 50 hits then only first 20 his will be considered.
- Total Latent Prints: 08 ,
- Total weightage for out of 80 : 80* total score/80
- Lets take this as **="L2”**

Total marks for speed and Accuracy =
0.3*(T1+L1) +0.7* (T2+L2)

Model RFP for State AFIS

The Model RFP should incorporate followings:

- Certifications
- System design & Architecture
- Local Customization
- Legacy Database conversion
- Standardizing of Demographic Database as per NCRB guidelines
- Evaluation Methodology .
- Integration with FED & NAFIS
- Future scalability
- Adoptability with future technologies like AFRS & IRIS
- Best quality computer & networking hardware.
- System / data security at all levels
- Asset management capability.

Thanks !
Any Question ?