Public Key Infrastructure & eSign in India

September 2015

Vikash Chourasia

Yojana Bhawan, Shillong

Controller of Certifying Authorities

Department of Electronics and Information Technology

Ministry of Communications and Information Technology

Information Technology (IT) Act, 2000

- The Information Technology Act 2000 facilitates acceptance of electronic records and Digital Signatures through a legal framework for establishing trust in e-Commerce and e-Governance.

- Controller of Certifying Authorities (CCA) appointed under Section 17 of the IT Act, 2000 to promote the use of Digital Signatures for e-Governance & e-Commerce.

Functions of CCA

- Licensing Certifying Authorities (CAs) under section 21 of the IT Act and exercising supervision over their activities

- Controller of Certifying Authorities as the "Root" Authority certifies the technologies and practices of all the Certifying Authorities licensed to issue Digital Signature Certificates

- Laying down the standards to be maintained by the CAs,

- Addressing the issues related to the licensing process including:
  - Approving the Certification Practice Statement(CPS);
  - Auditing the physical and technical infrastructure of the applicants through a panel of auditors maintained by the CCA.

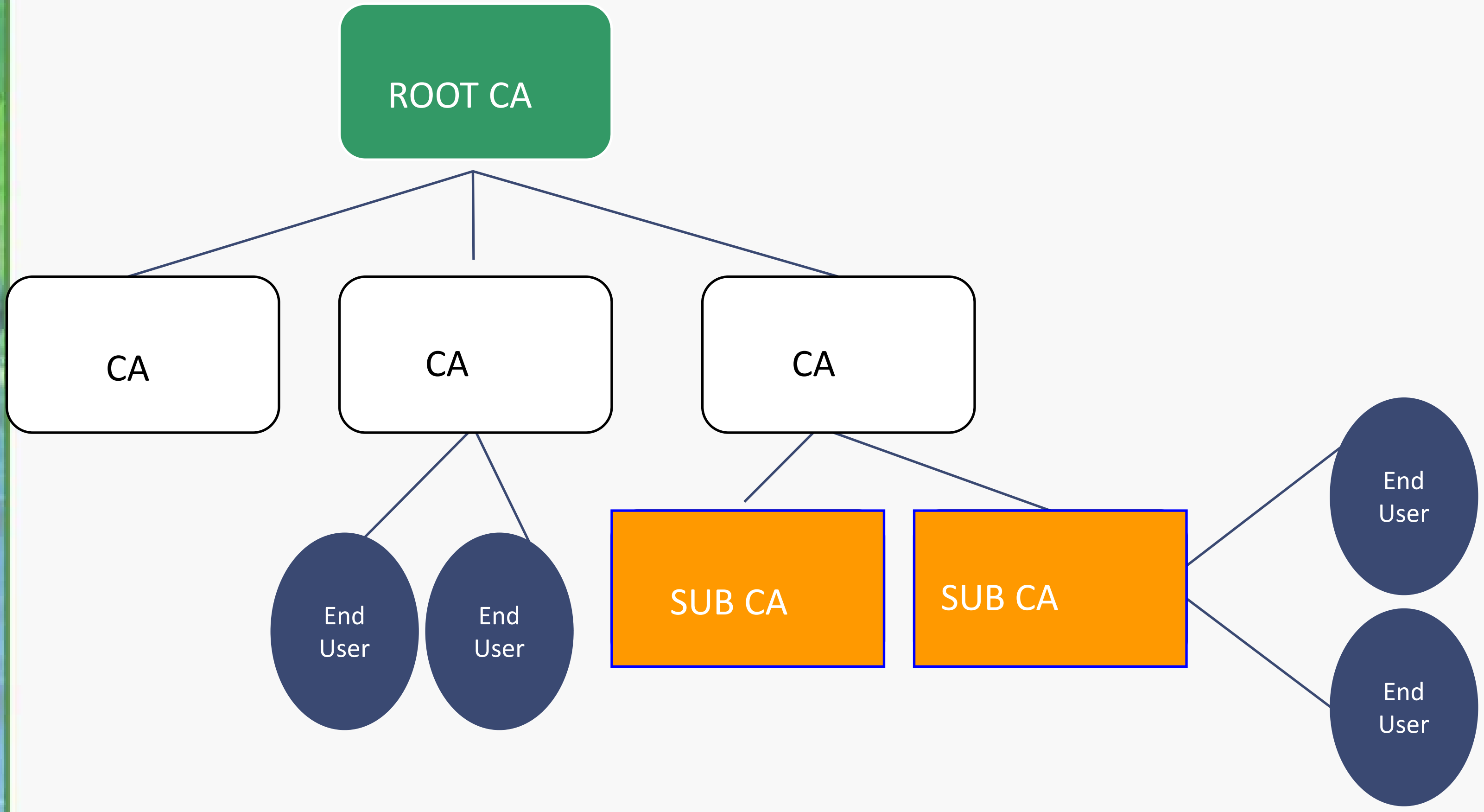
Regulation of Certifying Authorities

- CCA promotes the growth of E-Commerce and E-Governance through the wide use of Electronic (Digital) signatures

- There are seven licensed Certifying Authorities issuing Digital signature Certificates (DSC)

- More than 90,00,000 Digital signature Certificates were issued by the licensed Certifying Authorities till date

India PKI Model



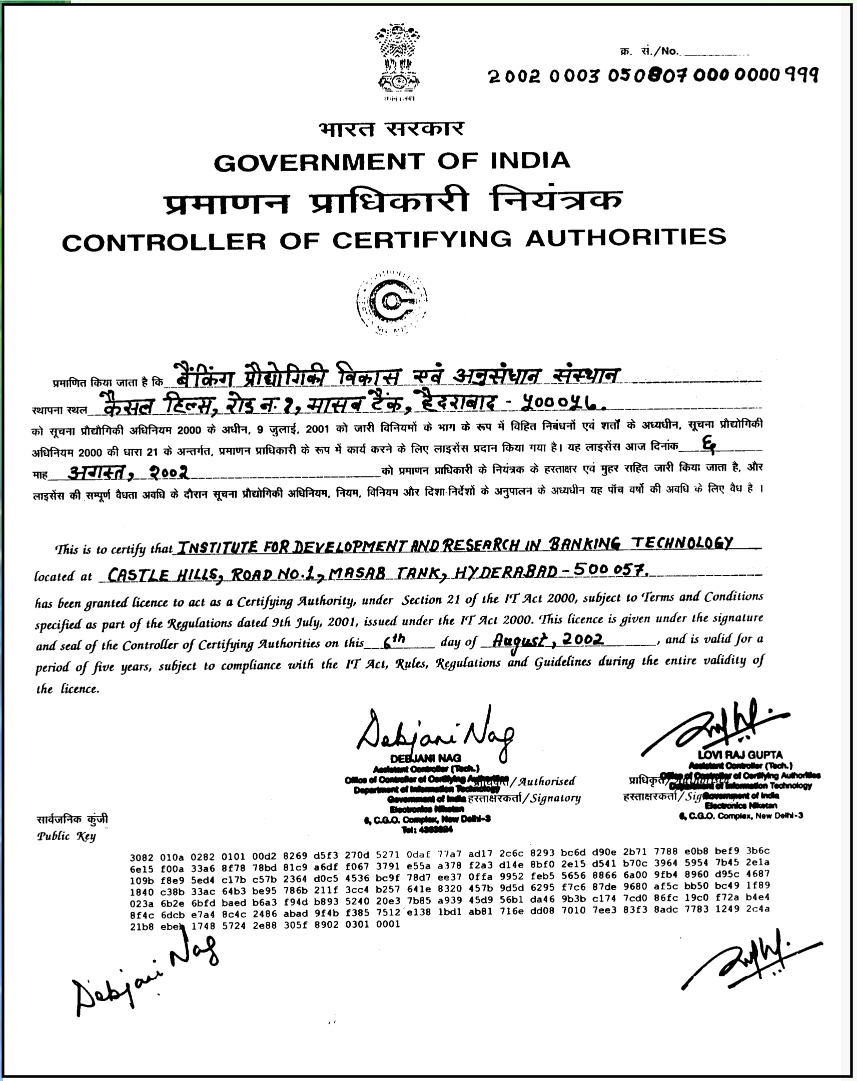
Controller of Certifying Authorities (CCA)

Certifying Authorities(CA) licensed by CCA to issue Digital Signature Certificates(DSC)

1) Sify
2) IDRBT
3) NIC
4) TCS
5) (n)Code Solutions
6) eMudhra
7) IAF

IDRBT Certificate

Paper



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भारत सरकार

GOVERNMENT OF INDIA

प्रमाणन प्राधिकारी नियंत्रक

CONTROLLER OF CERTIFYING AUTHORITIES

प्रमाणित किया जाता है कि बैंकिंग प्रौद्योगिकी विकास एवं अनुसंधान संस्थान

स्थापना स्थल कैसल हिल्स, रोड नं. 1, मासब टैंक, हैदराबाद - 500057.

को सूचना प्रौद्योगिकी अधिनियम 2000 के अधीन, 9 जुलाई, 2001 को जारी विनियमों के भाग के रूप में विहित निबंधनों एवं शर्तों के अध्यधीन, सूचना प्रौद्योगिकी अधिनियम 2000 की धारा 21 के अन्तर्गत, प्रमाणन प्राधिकारी के रूप में कार्य करने के लिए लाइसेंस प्रदान किया गया है। यह लाइसेंस आज दिनांक 6 माह अगस्त, 2002 को प्रमाणन प्राधिकारी के नियंत्रक के हस्ताक्षर एवं मुहर सहित जारी किया जाता है, और लाइसेंस की सम्पूर्ण वैधता अवधि के दौरान सूचना प्रौद्योगिकी अधिनियम, नियम, विनियम और दिशा-निर्देशों के अनुपालन के अध्यधीन यह पाँच वर्षों की अवधि के लिए वैध है।

This is to certify that INSTITUTE FOR DEVELOPMENT AND RESEARCH IN BANKING TECHNOLOGY *located at* CASTLE HILLS, ROAD NO.1, MASAB TANK, HYDERABAD - 500 057. *has been granted licence to act as a Certifying Authority, under Section 21 of the IT Act 2000, subject to Terms and Conditions specified as part of the Regulations dated 9th July, 2001, issued under the IT Act 2000. This licence is given under the signature and seal of the Controller of Certifying Authorities on this* 6th *day of* August, 2002, *and is valid for a period of five years, subject to compliance with the IT Act, Rules, Regulations and Guidelines during the entire validity of the licence.*

Debjani Nag

DEBJANI NAG
Assistant Controller (Tech.)
Office of Controller of Certifying Authorities
Department of Information Technology
Government of India
Electronics Niketan
6, C.G.O. Complex, New Delhi-3
Tel: 4363694

प्राधिकृत/*Authorised*
हस्ताक्षरकर्ता/*Signatory*

LOVI RAJ GUPTA
Assistant Controller (Tech.)
Office of Controller of Certifying Authorities
Department of Information Technology
Government of India
Electronics Niketan
6, C.G.O. Complex, New Delhi-3

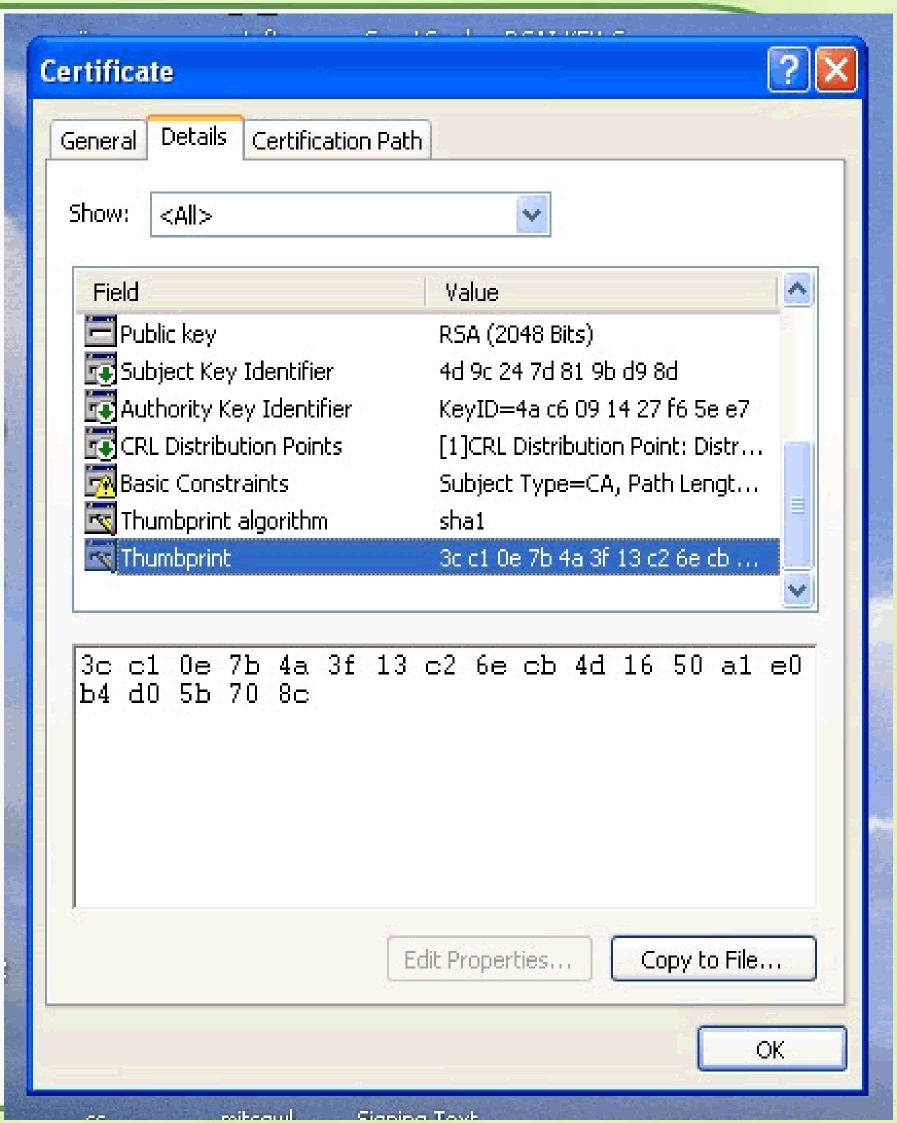
प्राधिकृत/*Authorised*
हस्ताक्षरकर्ता/*Signatory*

सार्वजनिक कुंजी
Public Key

```
3082 010a 0282 0101 00d2 8269 d5f3 270d 5271 0daf 77a7 ad17 2c6c 8293 bc6d d90e 2b71 7788 e0b8 bef9 3b6c
6e15 f00a 33a6 8f78 78bd 81c9 a6df f067 3791 e55a a378 f2a3 d14e 8bf0 2e15 d541 b70c 3964 5954 7b45 2e1a
109b f8e9 5ed4 c17b c57b 2364 d0c5 4536 bc9f 78d7 ee37 0ffa 9952 feb5 5656 8866 6a00 9fb4 8960 d95c 4687
1840 c38b 33ac 64b3 be95 786b 211f 3cc4 b257 641e 8320 457b 9d5d 6295 f7c6 87de 9680 af5c bb50 bc49 1f89
023a 6b2e 6bfd baed b6a3 f94d b893 5240 20e3 7b85 a939 45d9 56b1 da46 9b3b c174 7cd0 86fc 19c0 f72a b4e4
8f4c 6dcb e7a4 8c4c 2486 abad 9f4b f385 7512 e138 1bd1 ab81 716e dd08 7010 7ee3 83f3 8adc 7783 1249 2c4a
21b8 ebeb 1748 5724 2e88 305f 8902 0301 0001
```

Debjani Nag

Electronic



Show: <All>

Field	Value
Public key	RSA (2048 Bits)
Subject Key Identifier	4d 9c 24 7d 81 9b d9 8d
Authority Key Identifier	KeyID=4a c6 09 14 27 f6 5e e7
CRL Distribution Points	[1]CRL Distribution Point: Distr...
Basic Constraints	Subject Type=CA, Path Lengt...
Thumbprint algorithm	sha1
Thumbprint	3c c1 0e 7b 4a 3f 13 c2 6e cb ...

```
3c c1 0e 7b 4a 3f 13 c2 6e cb 4d 16 50 a1 e0
b4 d0 5b 70 8c
```

Classes of Certificates

Assurance Level	Assurance	Applicability
Class 0	This certificate shall be issued only for demonstration / test purposes.	This is to be used only for demonstration / test purposes.
Class 1	Class 1 certificates shall be issued for both business personnel and private individuals use.	This provides a basic level of assurance These are given on soft tokens.
Class 2	These certificates will be issued for both business personnel and private individuals use. These certificates will confirm that the information in the application. Address proof and Identity Proof are required along with the application form.	This level is relevant to environments where risks and consequences of data compromise are moderate. These are issued on hardware tokens.
Class 3	This certificate will be issued to individuals as well as organizations. As these are high assurance certificates, primarily intended for e-commerce applications, they shall be issued to individuals only on their personal (physical) appearance before the Certifying Authorities.	This level is relevant to environments where threats to data are high or the consequences of the failure of security services are high. This may include very high value transactions or high levels of fraud risk. These are issued on hardware tokens.

Digital Signature Enabled Applications

- Ministry of Corporate Affairs MCA21 for e-filing
- Income Tax e-filing
- Indian Railway Catering & Tourism Corporation (IRCTC)
- Director General of Foreign Trade (DGFT)
- Reserve Bank of India (SFMS & RTGS)
- Court Application

Digital Signature Enabled Applications

E-Procurement

- Indian Farmers Fertiliser Cooperative Limited (IFFCO)
- Directorate General of Supplies & Disposals (DGS&D)
- Oil and Natural Gas Corporation (ONGC)
- Gas Authority of India Ltd (GAIL)
- Air-India, Indian Railways etc.

Promoting the use of Digital Signatures

Awareness creation

Advertisements in leading newspapers regarding :

- The issuance process for Digital Signature Certificates

- The dos-and-dont's for using Digital Signatures

Promoting the use of Digital Signatures

Awareness creation

Targeted workshops/meetings for specific sectors

- Finance
- Procurement
- Trading Community
- Income Tax
- Customs
- Judiciary
- Industry
- Government

Promoting the use of Digital Signatures

- Working with RBI & IBA towards facilitating Digital Signatures for Internet Banking

DSC validation

- Provide certificate validation services based on the Online Certificate Status Protocol (OCSP) in accordance with RFC 2560
- White Listing of DSCs issued
- Validation of trust path leading up to the Root
- According legal validity to other PKI based signatures (XML, CMS, ..)

Incorporation of CCAs Root Certificate in Browsers & other products

- Microsoft – commenced in 2009
- Adobe – in 2015
- Mozilla, java - in progress

Mutual recognition of other electronic Signature regimes

For a Digital Signature Certificate issued by a Foreign Certifying Authority to be recognized in India, gazette Notification containing two sets of Regulations have been issued.

- Foreign Certifying Authorities operating under a PKI Regulatory Authority comparable to that in India.
- Foreign Certifying Authorities which are not operating under a PKI Regulatory Authority.

- ***MoU for former and application for latter?***

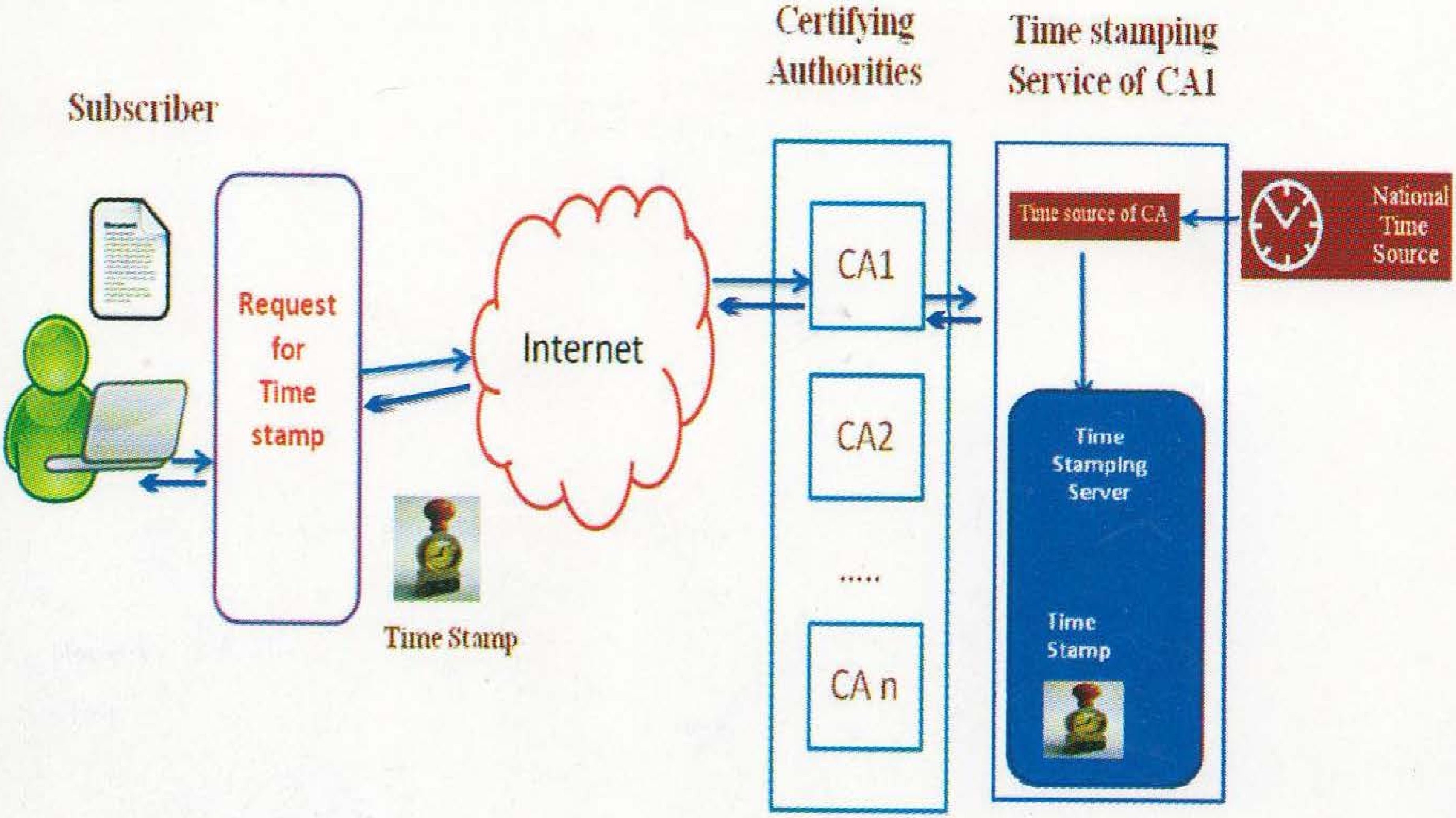
Enabling Digital Signatures on Mobile phones

- Hardware based
  - Cryptographic SIM cards
- Software based
  - Through APPs incorporating cryptographic algorithms

Time Stamping Service

- The IT (CA) Regulations mandate provisioning of Time Stamping Services by Certifying Authorities (CA) who issue Digital Signature Certificates(DSC) under the Information Technology (IT) Act, 2000
- Digitally signed **Time stamps** are based on time derived from National time source
- Time stamps can be verified to establish the time when a document or transaction was created.

Time Stamping



Time Stamping Service - Benefits

- Accurate time in conformance with Government Guidelines
- Digitally signed time stamps – verifiable in future
- Assured Integrity and Non-repudiability
- Electronic Notary
- Fraud detection
- Time Stamped content is protected from public exposure
- The only legally acceptable time stamping service

Time Stamping Service - Applications

- eProcurement
- eTendering
- ePatent and Copyright
- eFiling of statutory returns
- eBanking
- eMail
- eContracts and other electronic documents

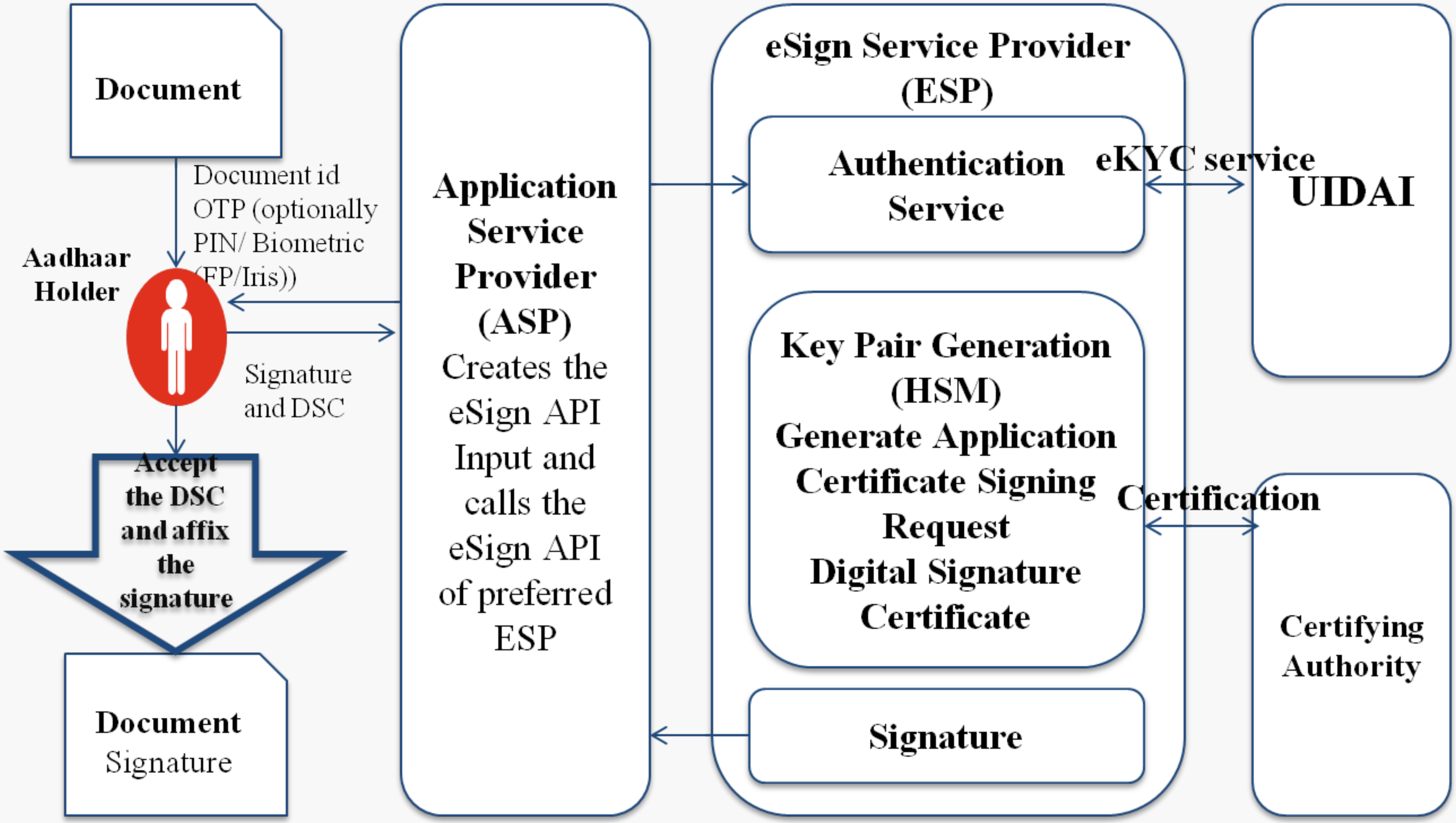
Challenges in scaling up usage of electronic Signatures

- Personal digital signature requires person’s identity verification and issuance of USB dongle having private key, secured with a password/pin.
- Current scheme of physical verification, document based identity validation, and issuance of physical dongles does not scale to a billion people.
- The major cost of the DSC is found to be the verification cost. Certifying Authorities engage Registration Authorities to carry out the verification of verification of credentials prior to issuance of certificate.
- Physical USB Dongle compliant to mandated standards also adds to the cost.
- Relying on the DSC applicant's information already available on the public database is an alternate to Manual verification. UIDAI provides one such alternative.

The Unique Identification Authority of India (UIDAI)

- The Unique Identification Authority of India (UIDAI) has been established with the mandate of providing a Unique Identification Number (Aadhaar Number) to all residents.
- During enrolment, the following data is collected:
  - Demographic details such as the name of the resident, address, date of birth, and gender;
  - Biometric details such as the fingerprints, iris scans, and photograph; and
  - Optional fields for communication of such as the mobile number and email address.

eSign overview



Document

Document id
OTP (optionally
PIN/ Biometric
(FP/Iris))

Aadhaar Holder

Signature and DSC

Accept the DSC and affix the signature

Document Signature

Application Service Provider (ASP)
Creates the eSign API Input and calls the eSign API of preferred ESP

eSign Service Provider (ESP)

Authentication Service

eKYC service

UIDAI

Key Pair Generation (HSM)
Generate Application Certificate Signing Request
Digital Signature Certificate

Certification

Certifying Authority

Signature

HSM – Hardware Security Module

OTP – One Time Password

ESP – eSign Service Provider

ASP – Application Service Provider

eKYC – electronic Know Your Customer

DSC – Digital Signature Certificate

FP – Finger Print

UIDAI – Unique Identification Authority of India

Use Cases- eSign Online Electronic Signature Services

- ✓ eSign online Electronic Signature Service can be effectively used in scenarios where signed documents are required to be submitted to service providers – Government, Public or Private sector.

- ✓ The agencies which stand to benefit from offering eSign online electronic signature are those that accept large number of signed documents from users.

Use Cases- eSign Online Electronic Signature Services	
Digital Locker	✓ Self attestation
Tax	✓ Application for ID, e-filing
Financial Sector	✓ Application for account opening in banks and post office
Transport Department	✓ Application for driving licence renewal, vehicle registration
Various Certificates	✓ Application for birth, caste, marriage, income certificate etc
Passport	✓ Application for issuance, reissue
Telecom	✓ Application for new connection
Educational	✓ Application forms for course enrollment and exams
Member of Parliament	✓ Submission of parliament questions

Thanking you

Vikash Chourasia
vikash@cca.gov.in

Controller of Certifying Authorities
Electronics Niketan,
6 CGO Complex, Lodhi Road,
New Delhi - 110003

Website : www.cca.gov.in