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Institute for Development and Research in Banking
Technology



OVERVIEW DOCUMENT

OPEN STANDARDS FOR SMART CARD BASED SOLUTIONS FOR FINANCIAL INCLUSION (Ver.1.2)

Contributors

1. SHRI S.K. SINHA,
SENIOR TECHNICAL DIRECTOR,
NATIONAL INFORMATICS CENTRE
2. DR. PHALGUNI GUPTA,
PROFESSOR,
INDIAN INSTITUTE OF TECHNOLOGY
KANPUR
3. SHRI S. MUKHOPADHYAY,
GENERAL MANAGER,
STATE BANK OF INDIA
4. SHRI S. C. DHOLE,
GENERAL MANAGER,
UCO BANK
5. DR. K. RAVINDRANATH,
CHIEF MANAGER,
UNION BANK OF INDIA
6. SHRI R.SUBRAMANIAKUMAR,
ASSISTANT GENERAL MANAGER,
PUNJAB NATIONAL BANK
7. SHRI K. RAMACHANDRAN,
ASSISTANT GENERAL MANAGER,
CORPORATION BANK
8. SHRI N. P. MOHAPATRA,
ASSISTANT GENERAL MANAGER,
NABARD
9. SHRI RAMESH KUMAR,
GENERAL MANAGER,
SOUTH MALABAR GRAMEEN BANK
10. DR. V.N. SASTRY,
ASSOCIATE PROFESSOR,
IDRBT
11. DR. M.V.N.K. PRASAD,
ASSISTANT PROFESSOR,
IDRBT
12. DR. MAHIL CARR,
ASSISTANT PROFESSOR,
IDRBT
13. MS. PRABHUTA VYAS,
SENIOR VICE PRESIDENT,
INDIAN BANKS' ASSOCIATION
14. SHRI K.I. VAREED,
VICE PRESIDENT,
INDIAN BANKS' ASSOCIATION

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1 Introduction

According to the Committee on Financial Inclusion (Jan.2008) the recent developments in Banking Technology have transferred banking from traditional brick and mortar infrastructure like staffed infrastructure to as system supplemented by other channels like ATMs, Credit/Debit Cards, Internet Banking, Online Money transfers etc. However, the access to the technology at present is restricted only to a certain segment of the society.

According to the Committee “Access to finance by the poor and vulnerable groups is a prerequisite for poverty reduction and social cohesion. This has to become an integral part of our efforts to promote inclusive growth. In fact, providing access to finance is a form of empowerment of the vulnerable groups. Financial inclusion denotes delivery of financial services at an affordable cost to the vast sections of the disadvantaged and low-income groups. The various financial services include credit, savings, insurance and payments and remittance facilities. The objective of financial inclusion is to extend the scope of activities of the organized financial system to include within its ambit people with low incomes. Through graduated credit, the attempt must be to lift the poor from one level to another so that they come out of poverty. NSSO data reveal that 45.9 million farmer households in the country (51.4%), out of a total of 89.3 million households do not access credit, either from institutional or non-institutional sources. Further, despite the vast network of bank branches, only 27% of total farm households are indebted to formal sources (of which one-third also borrow from informal sources). Farm households not accessing credit from formal sources as a proportion to total farm households is especially high at 95.91%, 81.26% and 77.59% in the North Eastern, Eastern and Central Regions respectively. Thus, apart from the fact that exclusion in general is large, it also varies widely across regions, social groups and asset holdings.

The poorer the group, the greater is the exclusion.” (Rangarajan, 2008)

Based on the above consideration, a broad working definition of Financial Inclusion can be as under:

“Financial inclusion may be defined as the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost.”

Extending banking to the rural areas where there are no bank branches, consistent power supply or communication links such as telephones or Internet is a daunting task. This calls for newer approaches in taking banking to remote regions. One solution that RBI has come up with is to enable customers intermediate banking facilities through business correspondents who act as agents on behalf of banks. As law mandates, any transaction on an account involving cash has to be made within the physical premises of the bank. The Reserve Bank of India has permitted the appointment of business correspondents who have the authority to accept deposits or make cash payments when customers would like to withdraw or deposit money from or to their accounts at locations other than bank premises. Instead of opening full-blown brick and mortar bank branches in remote districts (an expensive proposition) it is proposed that with the help of modern information technology and managerial capabilities of business correspondents banking functionalities could be extended to remote regions.

1.1 Rationale for Standardization in Smart Card Solutions

Many banks have started implementing financial inclusion projects with the help of Information and Communication Technology (ICT) solutions. Broadly, two technologies have been so far explored. One is based on Smart Card technology and the other is based on Mobile based solutions. Smart card solutions have been relatively easily implemented compared to the mobile based solution as it is in nascent stage. In this document, an attempt has been made to consider the issues related to Smart Card solution.

Various implementations of the smart card-based solutions have been initial pilots and have not been scaled up and are quite limited in their scope. In many pilots all the three components viz. Smart cards, Bank terminals and Business Correspondent services are provided by the same vendor/group.

1.2 Challenges

Almost all the banks, barring a couple have not been able to roll out the pilots. The challenges are to enable:

- Making large-scale procurement and implementation of end to end solution difficult.
- Rendering intra-bank as well as inter-bank interoperability difficult due to proprietary solutions.
- Problems in interfacing with CBS platforms.
- Lack of standard technology components of the smart card based solution across the industry.
- Lack of an authority for testing and certifying that the specified standards for smart cards, bank terminals are complied with and adhered to.

- Ensuring data security of cards and terminals during manufacture, storage and transit.
- Designing and implementing a common Key Management System that works across different vendor implementations.
- Evolving a business model that makes the business correspondent model viable as costs are high due to small size and multiple technology solutions.

1.3 Advantages of Common Standards

- Common standards facilitate pan India deployment by the bank.
- Common standards would bring in demand aggregation and economies of scale in procurement and deployment.
- Common standards help in accelerating ICT deployment and avoid vendor lock in for all technology components.
- Common standards enhance convenience to customers and provide inter-bank and intra-bank access.

To address these issues IBA and IDRBT teamed up to organise a workshop on “Open Standards for Financial Inclusion”. After deliberations of the various issues, a “Technical Committee on Open Standards for Financial Inclusion” was constituted comprising of a few select banks like State Bank of India, Punjab National Bank, Union Bank of India, Corporation Bank, South Malabar Gramin Bank, UCO Bank, NABARD and institutions like IIT Kanpur and National Informatics Centre (NIC). This Committee ‘IBA – IDRBT Technical Committee on Open Standards for Financial Inclusion’ has been working since February 2009. The first draft of the technical standards specification deals with the smart card based solution standards which relate to the following areas: the card numbering scheme, the smart card hardware, the smart card operating system, the smart card architecture, the bank terminal functionality and the

security framework (the key management system). The draft also deals with a migration path for adoption of these standards and certification for adherence to these standards.

The draft report is now placed in public domain for suggestions and comments by all stake holders such as public, banks, technology solution providers, microfinance institutions, NBFCs, NGOs, self help groups etc. We are confident that finalisation of these open standards will facilitate an efficient roll-out of the Financial Inclusion projects which will be user friendly and non-proprietary by making bank terminals interoperable.

2 Smart Card based Solution for Financial Inclusion

Information technology should enable banks to provide services that have the following business requirements:

- Banking services such as deposits, withdrawals, remittances, loans, insurance, micro-pension, funds transfer etc. are to be provided.
- Every customer must be identified uniquely by some universal means that can be recorded and proved to auditors/regulators and the banker/customer beyond doubt. Biometric authentication by fingerprint has stood the test of time. Some standards and industry norms are available for this technology which needs minimal capture-verification set up in terms of cost, user acceptance and user convenience. Biometric authentication using fingerprints have proved to be more secure than PIN authentication.
- Both online and offline transactions must be possible. The transactions through the BC may not be available at branches. If necessary where the bank branch needs to handle transactions a bank terminal may be provided at the branch.
- Balance enquiry and mini-statement showing minimum last five transactions must be possible at all terminal locations.
- No transaction should be lost in the entire system.

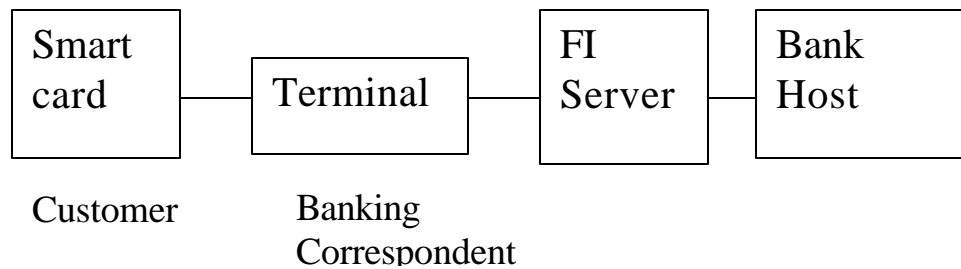


Figure 1: Model of Smart Card based Solution

The model proposed for extending banking services initiative is outlined in Figure 1. Each customer is given a smart card with his primary account number and other personal details such as address, nominee details, contact information and transaction history stored within it. The smart cards are to be used at bank handheld terminals owned by a bank and operated by business correspondents. The Terminal Operator Card and the Customer Card are mutually authenticated. The customer is authenticated using the biometric fingerprint of the customer stored in the smart card. These bank terminals are to have connectivity through any communication channels such as Global System for Mobile communications (GSM), Code Division Multiple Accesses (CDMA), Public Switched Telephone Network (PSTN), Ethernet depending upon the type of connectivity available at the local place of operation. However connected, the communication finally will reach the back-end intermediate Financial Inclusion Server (held by service provider/Bank). All customer details and account information including current balance is held by the FI Server which will regularly update the bank host. The smart card is used for customer authentication, whenever transactions are made at bank terminals. The solution also requires card lifecycle management, bank terminal lifecycle management, bank terminal operator management, solution provider and bank business rule management.

3 Standardization

The IBA-IDRBT Committee on Open Standards for Financial Inclusion has addressed these aspects relating to standards:

- a. The Smart Card Numbering Scheme
- b. The Smart Card Operating System
- c. The FI Customer Card Data Architecture
- d. The FI Terminal Operator Card Data Architecture
- e. The Terminal Functionality Specification
- f. Key Management System

3.1 Card Numbering Scheme

There is a necessity for a uniform card number for financial inclusion cards across the industry. Normal debit/credit cards use the card number to route the cardholder information and the transaction details to appropriate bank server. Hence the bank terminal/ATM and the backend switch need to identify the card presented using the card number to get authorization for the banking transaction from the host server. The scheme to be followed is as under:

Length of the card number: 19 Digits

- 9 – National Scheme
- 356 – Country Code
- XXXX – Bank Identification Number *
- XXXXX – Branch Code *
- XXXXX – Card Serial Number *
- X – Checksum (Luhn's algorithm) *

* X are all numerals

The Bank Identification Number (BIN) will be issued by a common agency like IDRBT. In case a particular branch has more than 1 lakh customers, bank may opt for an additional BIN.

3.2 Smart Card Hardware Specification

The Smart Card should have the following characteristics:

- Microcontroller based
- Interface: Contact or Contact less. In case of contact interface it must comply to **ISO 7816 (T=0 or T=1)**. In case of contact less it must comply to **ISO 14443 (Type A or Type B)**.
- EEPROM size: Customer Card-32K
Terminal Operator Card- 64 K
- Size and material of card body: Size must comply to **ISO 7816 Part 1** standard. Material of card body can be PVC, PET/PETG, Polycarbonate or composite plastic made up of combination of any of these plastic materials based on the required card life span.
- In case of contact interface card, it must comply to ISO/IEC 7816 - 1,2 &3
- In case of contact less interface card, must comply to ISO/IEC 14443-1,2&3
- Supply voltage 3V nominal (in case of contact)
- Transport protocol: T=0 or T=1 (in case of contact interface); T=CL (in case of contact less interface)
- Minimum 10 years data retention

- Min 300,000 E²PROM write cycles
- Operating ambient temperature range –25°C to +70°C

3.3 Smart Card Operating System

The Committee considered various different options for the smart card OS. The Committee decided to adopt the SCOSTA standard since it is available free of cost compared to other operating systems that are priced and a licence fee is required. This reduces the cost to the customer and the implementing bank. Secondly, since SCOSTA has been adopted by the Government of India for various applications such as RSBY, NREGS, Driving License, E-Passport etc., we envisage that the SCOSTA framework will enable multi-applications where other government schemes could be incorporated.

- In case of contact interface card, the card OS must comply to SCOSTA 1.2b or SCOSTA-CL 1.2 with all their addendum and errata (ref. <http://scosta.gov.in>)
- In case of contact less interface card the card OS must comply to SCOSTA-CL 1.2 with all its addendum and errata (ref. <http://scosta.gov.in>)

3.4 Smart Card Data Architecture Specifications for FI Customer Card (FICC)

This specification lays down the card details, the cardholder details and account details such as balance and transaction history.

REFER: TECHNICAL DOCUMENT I

3.5 Smart Card Data Architecture Specifications for FI Terminal Operator Card (FITOC)

This specification is for the Terminal Operator Card. It will be used to perform mutual authentication – between a bank customer and a bank correspondent.

REFER: TECHNICAL DOCUMENT II

3.6 Terminal Functionality Specifications (Hardware and Software)

3.6.1 Minimal Functionality that should be supported

DEPOSIT
WITHDRAWAL
BALANCE ENQUIRY
MINI STATEMENT

3.6.2 Full Functionality (optional)

FUNDS TRANSFER/ REMITTANCES
BILL PAYMENTS
LOANS
INVESTMENTS (TERM DEPOSITS, FDs, RDs ETC.)

3.6.3 Extended Functionality

MUTUAL FUNDS
INSURANCE (LIFE, HEALTH, CROP, ETC.)
PENSIONS

REFER: TECHNICAL DOCUMENT III

3.7 Smart Card Security

- a. Mutual authentication between card and terminal using Triple-DES.
- b. Cardholder verification using biometric authentication – the fingerprint minutiae stored on the card.

REFER: TECHNICAL DOCUMENT IV

3.8 Quality Assurance

Card manufacturing facilities need to be audited for assuring quality standards. Regular audit needs to be undertaken to ensure that data security standards are followed in storage and transport of bank cards and terminals.

3.9 Transaction Atomicity

For all transactions only completed transactions have to be written on to the card or none of it. In case, there is a failure of the transaction due to whatever reason (power failure, card withdrawn etc.) no aspect of the transaction should be recorded. Anti-tearing features of smart card should be implemented.

3.10 Migration Path

These standards are meant for all prospective cards and will have no retrospective effect. Banks should phase out cards not conforming to the standard gradually.

3.11 Cards for Joint Accounts

The standards have provision for handling of joint accounts. These arise in the context of SHG accounts as well as in the context of joint accounts. The business rule of the bank will decide

- Whether one card is a primary card
- Whether both cards have to be present for a transaction.

3.12 Key Management System

A key management system (software based) must be developed by a central agency and deployed by each bank. The key management system permits security framework interoperability between bank terminals of a particular bank although supplied by different vendors. The process of generation, derivation, maintenance and revocation of keys needs to be the task of each bank.

4. Conclusion

The challenges that have to be addressed for a full scale implementation of the financial inclusion delivery channel are in the following areas:

- a. Technology and business aspects relating to financial inclusion initiative by providing training.
- b. Develop and maintain a security framework (key management system) for banks to implement smart card based solutions that allows for bank-wide and industry-wide interoperability.
- c. Research and development to optimize the various technology components in the financial inclusion implementation.
- d. Evolve a framework for testing compliance to standards.
- e. Explore new emerging technologies like mobile based solutions for financial inclusion initiative.
- f. Explore the possibility of demand aggregation and economies of scale for indicative prices for a quick rollout.

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