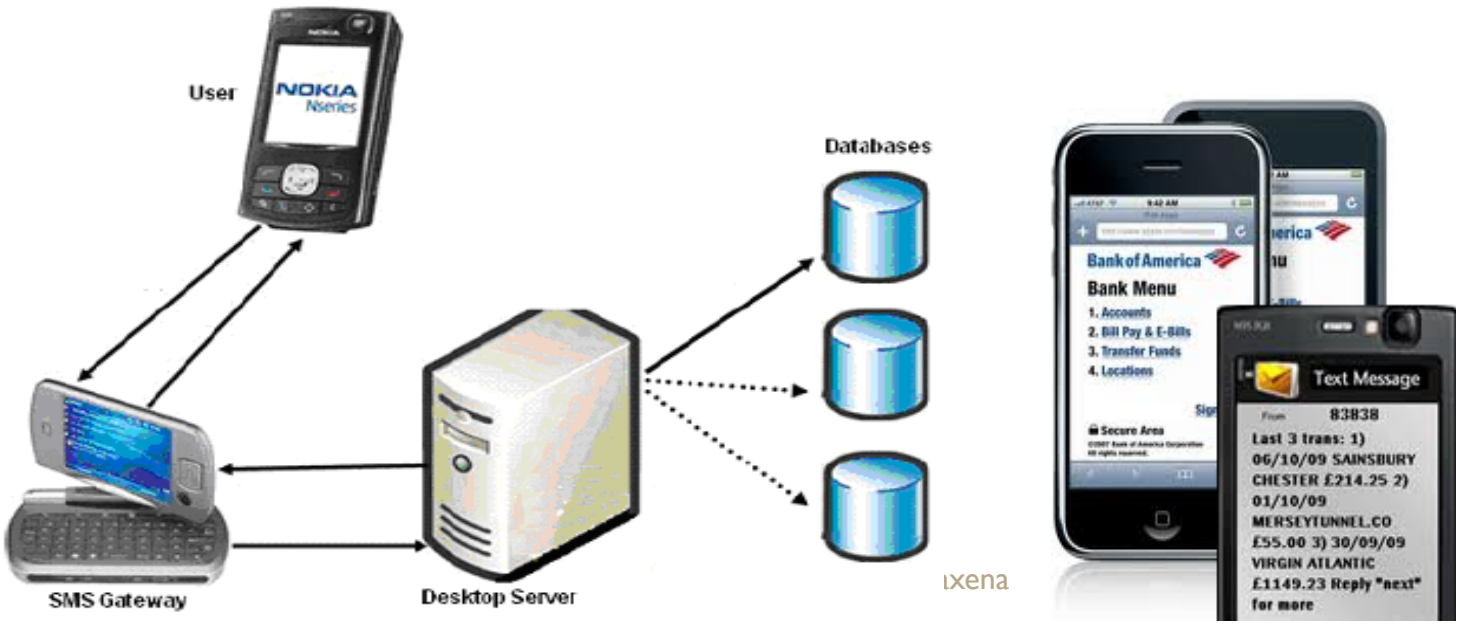
An Integrated Approach for SMS-Based Secure Mobile Banking in India

*Neetesh Saxena,
Narendra S. Chaudhari
IIT Indore, India

Introduction

- Various M-banking channels SMS, USSD, GPRS, WAP and phone based applications
- Nowadays, SMS is very popular and frequently used worldwide
- Traditional SMS service does not provide any security to transmitted message
- SMS-based m-banking can be extended as a secure channel



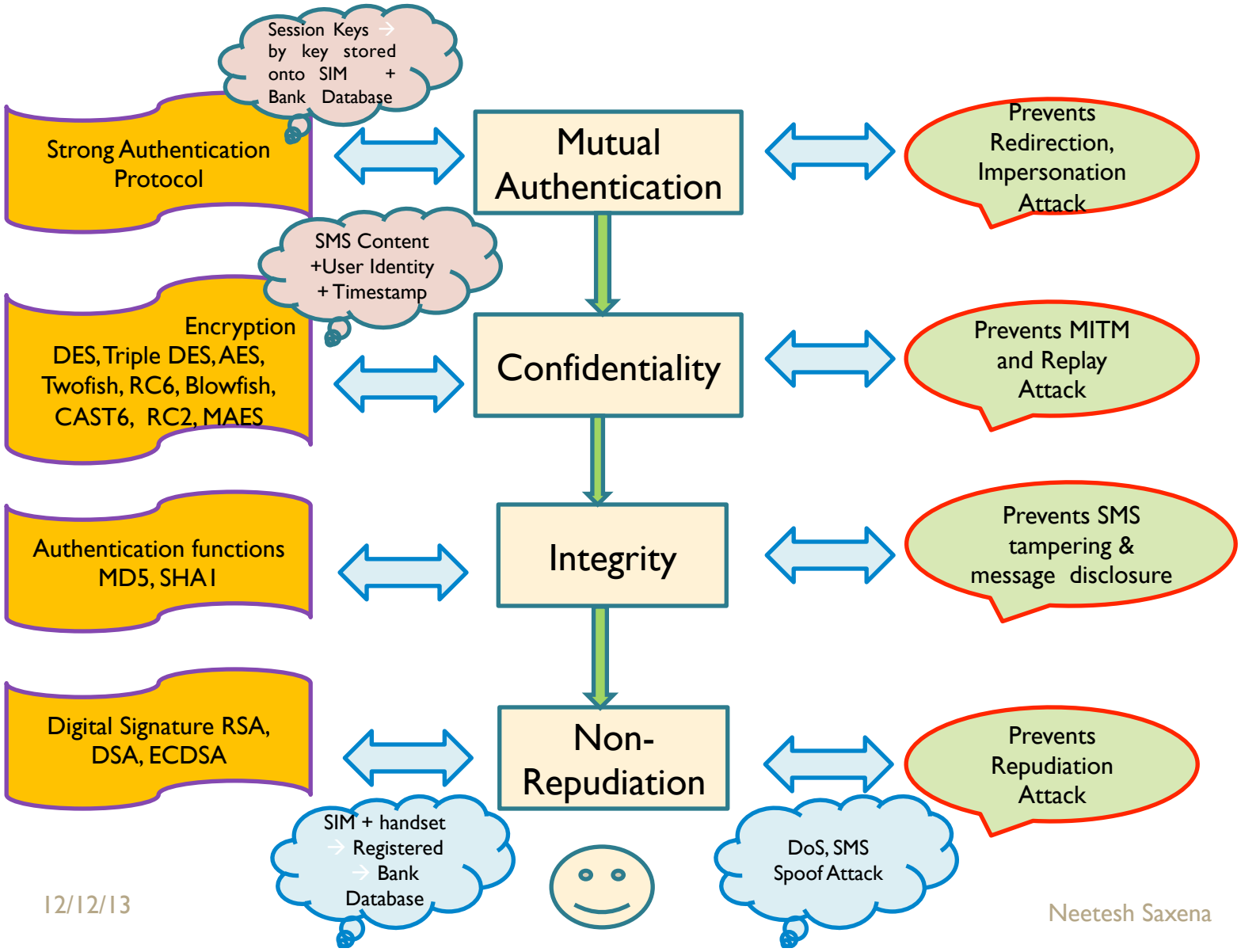
Problem Statement

- The objective → secure mobile banking using SMS
  - for the people who are living in the rural part of India
  - don't have java support cellular phones and Internet facility (limited)
- Presently, SMS is in clear text without any ciphering mode while transmitting
- SMS and its banking environment must be secure from various attacks
- Some banks provide change password option through SMS which is a threat
- Secure m-banking → authentication, confidentiality, integrity, non-repudiation.
- In India
  - Only banks can provide the facility of m-banking while
  - Other countries like Kenya and Philippines non-bank organizations can also do

Solving Approach

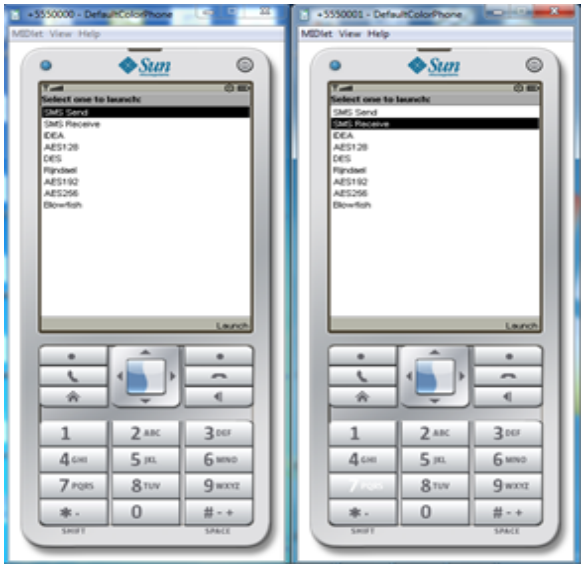
- The SIM → issued by → *Govt. authorized body of Telecomm. Department of India*
- Store a secret key for each bank onto the SIM at the time of manufacturing and in the database of respective banking server
- To manage SIM storage, limit a user → 3 to 5 m-banking services of different banks
- As per *Reserve Bank of India (RBI)* guidelines only banks can provide such facility
  - The current guidelines must be reviewed.
- An integration of service providers and different banks must be encouraged
- Proposed a separate SIM for the secure channel of communication

Continued…


Session Keys → by key stored onto SIM + Bank Database
Strong Authentication Protocol
Mutual Authentication
Prevents Redirection, Impersonation Attack
SMS Content +User Identity + Timestamp
Encryption DES, Triple DES, AES, Twofish, RC6, Blowfish, CAST6, RC2, MAES
Confidentiality
Prevents MITM and Replay Attack
Authentication functions MD5, SHA1
Integrity
Prevents SMS tampering & message disclosure
Digital Signature RSA, DSA, ECDSA
Non-Repudiation
Prevents Repudiation Attack
SIM + handset → Registered → Bank Database
DoS, SMS Spoof Attack

Results

- The platform used is J2ME Wireless Toolkit for user interface, MySQL database and Tomcat as server. The results have been generated with JDK1.7 and J2ME wireless messaging API.



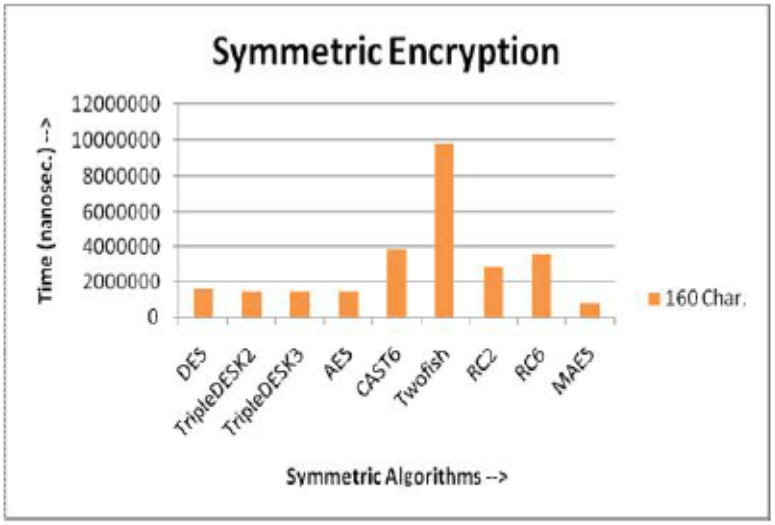


Fig. 1. Symmetric Encryption

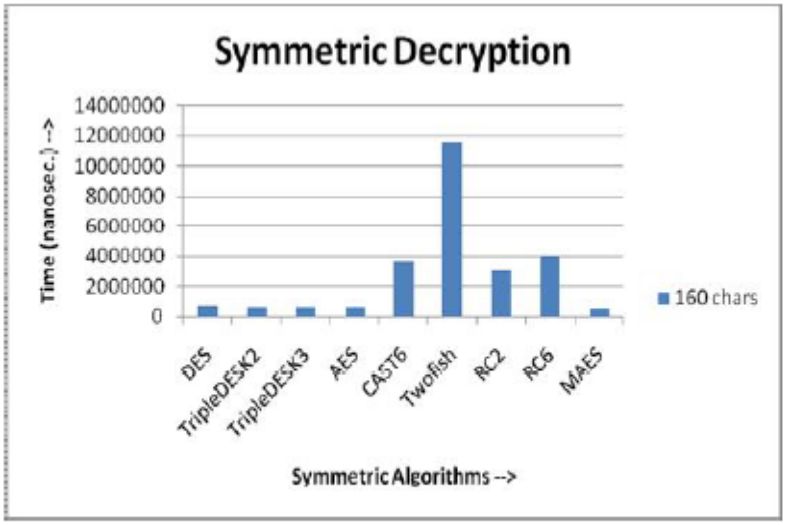


Fig. 2. Symmetric Decryption

Results

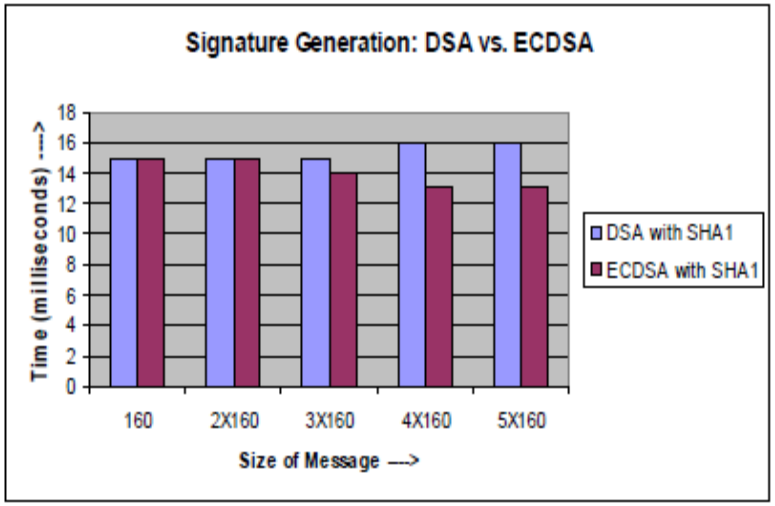


Fig. 3. Signature Generation

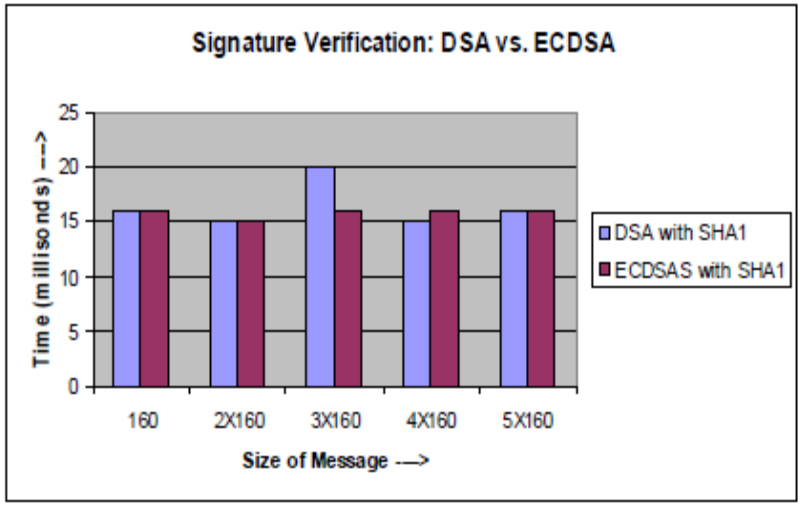


Fig. 4. Signature Verification

Future Work

- (1) Confidence interval for the MAES algorithm for ciphering;
- (2) Storage space for each key and algorithm: used physical, virtual and swap memory size;
- (3) Energy & Time Efficiency: CPU time, Encryption/Decryption time, Key generation time;
- (4) Implement a variant of ECDSA algorithm which is more secure than ECDSA (previous published work in ICMSAO-2013).

Thank You !!