The Case For The Digital Wallet

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Outline

• The Problem
• The intelliWal
• Supporting Technologies
• Working
• Applications/Scenarios

The Problem

• **Physical Wallet**
  - Thick and bulky
  - Hard to manage money/cards
  - No instant recording of transactions
  - Hard to recover from loss of stored items

The intelliWal

“A smart application running on a mobile device which incorporates and extends **all** the functionality provided by a conventional physical wallet”

<table>
<thead>
<tr>
<th>Conventional Wallet</th>
<th>intelliWal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thick, bulky and inconvenient to carry around</td>
<td>Lightweight and ultra-portable as the wallet functionality is integrated into a mobile phone</td>
</tr>
<tr>
<td>Cumbersome to retrieve individual items in the wallet, hand out money (especially change)</td>
<td>All transactions are conducted electronically, and a single intuitive interface is provided for managing the items in the wallet</td>
</tr>
<tr>
<td>Once transactions are made, there are no instant and easily accessible records which can be used to track the same</td>
<td>A comprehensive history of all transactions is maintained in the application, which makes tracking and monitoring activity related to the wallet simple</td>
</tr>
<tr>
<td>It is very difficult to recover the items stored in the wallet if they are lost or misplaced</td>
<td>In case of theft, the intelliWal can be deactivated until the user procures a fresh mobile device</td>
</tr>
</tbody>
</table>
And there’s more...

- **Point-to-Point (P2P) transactions**
  - Fast, convenient and efficient
  - Secure

- **Extensible**
  - “Plug and play” new items in a breeze

- **Smart use of loyalty/promotions**
  - intelliWal “suggests” appropriate item to employ during transaction

System Architecture

**Presentation**

**Application**

**Security**

**Communication**

- **Authentication**
- **Confidentiality**
- **Integrity**
- **Protocol**
- **Modulation**

System Anatomy

Users authenticate themselves using biometric/two-factor authentication before conducting transactions. The transaction is secure because the message is authenticated and encrypted. The intelliWallet application resides within the mobile phone. Point-to-point communication is established using NFC technology.

Technical Specifications

<table>
<thead>
<tr>
<th>Hardware Component</th>
<th>Product/Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>Nokia 6310</td>
</tr>
<tr>
<td>Communications Link</td>
<td>NFC chip</td>
</tr>
<tr>
<td>Security Link</td>
<td>DORIS SD card token</td>
</tr>
<tr>
<td>Kiosk Screen</td>
<td>Visotech</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Software Component</th>
<th>Product/Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Symbian</td>
</tr>
<tr>
<td>Programming Language</td>
<td>C++</td>
</tr>
<tr>
<td>IDE</td>
<td>Carbide.C++</td>
</tr>
</tbody>
</table>

Supporting Technologies
NFC-Enabled Phones Comparison

<table>
<thead>
<tr>
<th>Phone Model</th>
<th>Operating System</th>
<th>NFC Support</th>
<th>SD Memory Support</th>
<th>NFC Life</th>
<th>Available Markets</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nokia 6131</td>
<td>Nokia OS</td>
<td>Integrated</td>
<td>Yes</td>
<td>TT - 3.5hrs</td>
<td>US</td>
<td>N/A</td>
</tr>
<tr>
<td>Samsung SGH-X700</td>
<td>Nokia OS Prototype</td>
<td>Integrated</td>
<td>No</td>
<td>TT - 3.5hrs</td>
<td>US, Asia</td>
<td>N/A</td>
</tr>
<tr>
<td>Nokia 3220</td>
<td>Nokia OS</td>
<td>Shell</td>
<td>No</td>
<td>TT - 3.5hrs</td>
<td>US, Asia</td>
<td>N/A</td>
</tr>
<tr>
<td>Nokia 5140</td>
<td>Nokia OS</td>
<td>Shell</td>
<td>No</td>
<td>TT - 3.5hrs</td>
<td>US, Asia</td>
<td>N/A</td>
</tr>
<tr>
<td>ImcoSys Skinplex NFC</td>
<td>Linux OS</td>
<td>Integrated</td>
<td>Yes</td>
<td>TT - 3.4hrs</td>
<td>US, Asia, US</td>
<td>N/A</td>
</tr>
</tbody>
</table>

NFC - Overview

- **Short range wireless signal technology**
  - Range of communication: up to 4cm
  - Frequency: 13.56 MHz

- **Why NFS?**
  - Inherently secure
  - New revenue streams for businesses
  - Convenience for customers
  - Support mechanism for existing protocols

NFC - Standards

- **NFC Data Exchange Format (NDEF)**
  - Message encapsulation, exchange

- **NFC Record Type Definition (RTD)**
  - Guidelines for specification of well-known types for inclusion in NDEF messages

- **NFC Uniform Resource Identifier (URI)**
  - Certificate required to be used when NFC (NDEF) to retrieve a URI stored in an NFC-compliant tag, transporting URIs between devices

- **NFC Text RTD**
  - Certificate NFC Forum Well Known Type (NFC RTD) for plain text data. Can describe objects or an RFID tag

- **NFC Smart Poster RTD**
  - Certificate NFC Forum Well Known Type on putting URLs, SMSs, or phone numbers on an NFC Forum Tag or, transporting them between devices

NFC - Working

A growing market...
DORIS - Overview

- Digital Online Registration & Identification System
  - Open architecture personal security system
  - Support for several authentication forms
- Why DORIS?
  - Addresses security concerns for mobile phones
  - Guards against wireless hacking
  - Resistant to identity theft, spoofing
  - Can be integrated with a wide range of applications

DORIS - Working

Deployable on various portable platforms such as PDAs & NFC-enabled phones

Symbian - Overview

Applications/Scenarios
Peer To Peer Transactions

1. User1 (U1) search for User2 (U2)
2. U1 authenticates U2 or rejects U2
3. U1 confirms & accepts connection to U2
4. Authorized: U2 sends data to U1 (e.g., U1 to pay U2 $x)
5. U1 confirms & accepts data
6. U2 acknowledges acceptance; end session

Cash Card Transaction

1. User1 (U1) search for User2 (U2)
2. U1 authenticates U2 or rejects U2
3. U1 confirms & accepts connection to U2
4. Authorized: U2 sends data to U1 (e.g., U1 to pay U2 $x)
5. U1 confirms & accepts data
6. U2 acknowledges acceptance; end session

Credit Card Transaction