Migration Strategies
(With an Emphasis On Moving from 125 kHz Prox to 13.56 MHz Contactless Smart Card Technology)

Michael L. Davis
Managing Director
OmniTek – A Honeywell Company
Michael_davis@omnitek.com
www.omnitek.com
Agenda

• Introduction & Caveats
• Definitions
  – Prox, Contactless Smart Cards, Multi-technology Cards
• Why migrate to Contactless Smart Cards?
  – Comparisons, Features, Multi-application capabilities, ISO, etc.
• Migration Strategies
  ✷ Multi-technology cards
  ✷ Use existing cards and add contactless smart card sticker
  ✷ Use multi-technology readers
• Optimum Migration Strategy
• Migration choice comparisons
• Moving data from legacy applications
• Integrated card issuing
• Wedge Readers
• Summary
• Questions & Answers
• This presentation discusses migration strategies, not new project implementations

• Of course the best solution is to rip out the old legacy systems and start from scratch but
  – Cost impact is major factor
  – Re-badging thousands of employees may be an obstacle
  – What to do during interim period?

• Some of the solutions presented here may be the long-term solution or used as a stepping-stone for migration to a single contactless smart card solution
What is Prox?

• “Prox” is a term used predominately in the United States to describe an RFID technology used in the Access Control Market
  – Requires no physical contact between a card and reader
  – Operates at 125 kHz
  – Typical operating distance from 4 to 6”
  – Packaged in cards or key fobs
  – Read-only
  – Data content typically from 26 to 40 bits
  – Generally very low security of data
  – No ISO standards exist
  – More than 250 million Prox cards have been sold
What is Contactless Smart Card Technology?

• Contactless Smart Cards
  – Requires no physical contact between a card and reader
  – Operates at 13.56 MHz
  – Typical operating distance from 2” to 6”
  – Maximum operating distance of 39”
  – Packaged in cards, key fobs, stickers, labels, and more
  – Data content from 256 bits to 4k bytes and more
  – Memory can be segmented for *multi-application* use
  – Very high security
  – Supports true read/write on the fly
  – ISO Standardized (ISO 14443A/B & 15693)
What is a Multi-Technology Card?

- Card that contains more than one machine readable ID technology
- Choices include:
  - Contact Smart Card
  - 13.56 MHz Contactless Smart Card
    - PicoPass™, Mifare™, iClass™, MyD™, etc.
  - 125 kHz Prox
    - HID, Indala, AWID, EM, etc.
  - Magnetic Stripe
  - Debit Stripe
  - Bar Code
  - Optical Stripe
  - Barium Ferrite (Magnetic Technology)
  - Etc.
Why Migrate to Contactless Smart Cards?

- Better Security
- Faster Transaction Speed
- ISO Standardized
- Greater Memory Density
- Multi-Application
- Faster Transaction Speed
- Lower Card Production Costs

13.56 MHz

125 kHz
Why Migrate? (cont.)

• Added Benefits With No Increase in Price
• Increased Security
• Ability to use same card for additional applications:
  – Biometrics: Carry multiple templates on card
  – Logical Access
  – ID: Carry Tamperproof Digital Photographs
  – Portable Database: Encrypted Information for authentication or emergencies
• Interoperability
• Future Growth
Why Migrate? (cont.)

- **Multi-Application Support**
  - 64 bit serial number
  - 32 applications each with individual secret keys
  - Each application “slot” has up to 232 usable bytes
  - Can combine multiple apps to increase memory

### Multi Application example using PicoPass 32KS

<table>
<thead>
<tr>
<th>Application</th>
<th>Data Blocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Access Control</td>
</tr>
<tr>
<td>1 - 4</td>
<td>Logical Access</td>
</tr>
<tr>
<td>5</td>
<td>Time &amp; Attendance</td>
</tr>
<tr>
<td>6</td>
<td>Vending</td>
</tr>
<tr>
<td>7 - 14</td>
<td>Finger Print (2 fingers)</td>
</tr>
<tr>
<td>15 - 16</td>
<td>IRIS Scan</td>
</tr>
<tr>
<td>17 - 27</td>
<td>Digitally Signed Photograph</td>
</tr>
<tr>
<td>28 - 30</td>
<td>Environmental &amp; Building Mgmt</td>
</tr>
<tr>
<td>31</td>
<td>Burglar Alarm Arm/Disarm</td>
</tr>
</tbody>
</table>

Workshop on Storage & Processor Card-Based Technologies
July 8th, 2003
• **Multi-Application Support**
  – Smart cards allow multiple applications - each protected with its own keys
  – Vendor should disclose keys for unused applications, i.e., open key strategy
  – Open Key Strategy advantages:
    ✷ Other application slots free for use
    ✷ Increases value of access control card
    ✷ Allows one card to be used for many applications at the same time
    ✷ Eliminates obsolesce
    ✷ You're in control, switch access control vendors without reissuing cards
Why Migrate (cont.)

• International Standardization
  – Current 125 KHz Prox Technology
    ◆ No ISO existing or planned standardization
    ◆ Proprietary
      – HID, Motorola, AWID, Casi-Rusco, etc.
  – New 13.56 MHz Contactless Smart Cards
    ◆ Standards DO exist
      – ISO 14443A, 14443B, 15693
    ◆ Open standards with interoperability encourages broad supplier support and customer acceptance
    ◆ Open standards can increase market size driving prices down
    ◆ Facilitates interoperability between vendors and applications
    ◆ Helps to drive costs down
    ◆ Helps to eliminate obsolence
Migration Strategies

- Move data from multiple applications onto single card
- Utilize existing card and add smart card sticker
- Install multi-technology readers
The following slides illustrate the three major migration strategies.

Note that hybrid solutions combining elements from the different migration strategies are possible.
Migration Strategies

Move data from multiple applications onto single card

Utilize existing card and add smart card sticker

Install multi-technology readers
Migration Strategies: Use a Multi-Technology Card

- Method is to utilize the existing technologies for existing applications and put them on a single card
- Each legacy application utilizes the same technology that was used before
Migration Strategies: Use a Multi-Technology Card

- **Advantages**
  - Most aesthetic looking card
  - Most secure card

- **Disadvantages**
  - Most expensive card
    - Each technology contributes to manufacturing and cosmetic fallout
  - Reduced field-reliability due to multiple technologies
    - Some combination of technologies weaken card structure
    - Additional cost to re-badge due to failure
Migration Strategies

- Move data from multiple applications onto single card
- Utilize existing card and add smart card sticker
- Install multi-technology readers
• Several companies make a smart card “Sticker“
• Sticker contains antenna and chip just like a card
• Sticker utilizes a permanent adhesive for easy affixing to existing card
Migration: Use existing card w/smart card sticker

• Advantages
  – Much lower cost because existing card is not thrown out
  – No migration of existing information from legacy applications

• Disadvantages
  – Not as aesthetic as a single card
  – Slightly reduced range due to smaller antenna
  – Location of patch important so card still works in existing readers (like magstripe)
  – Some organizations (Gov’t, etc.) do not allow anything to be affixed to a card
  – Possible security issue if sticker is removed from card
    ◆ Patch is designed to self destruct when removed
    ◆ Electronic anti-tamper mechanisms available
Migration Strategies

- Move data from multiple applications onto single card
- Install multi-technology readers
Migration Strategies: Use Multi-Technology Readers

- Multi-technology readers are capable of reading two different technologies
  - Prox and Contactless Smart Card
  - Contact and Contactless Smart Card
  - Prox and Magnetic Stripe
- Multi-technology readers may have multiple output protocols and interfaces
  - Wiegand
  - Clock & Data
  - RS232
  - Etc.
Migration Strategies: Use Multi-Technology Readers

• Advantages
  – No changes to cards
  – No card re-badging

• Disadvantages
  – Typically most expensive migration strategy
    ◆ Cost of readers are higher
    ◆ Readers available from only a few vendors
    ◆ Not all technology choices available
  – Reader obsolescence occurs faster
Optimum Migration Strategy

• Optimum strategy is to migrate all legacy applications to just contactless smart card solution utilizing separate application areas
  – Single technology card is most cost effective and reliable

• Biggest stumbling block is
  – Retrieving data from legacy application and moving it to contactless smart card
  – Emulating legacy protocol and physical interface

• Can use all of the previous migration methods discussed for interim
Moving Data From Legacy Applications

- Best method is to electronically move data under computer control
  - No human typing errors
  - Can automate process
  - Very convenient, complete process can take less than 30 seconds
- Can almost always retrieve legacy data using its legacy reader interfaced to a PC
  - Security and internal formats need not be known since legacy reader already knows how to read card
  - Even if reader is proprietary, output data can usually still be captured at a PC
  - Ideal method to move legacy applications where vendor has gone out of business or is uncooperative
Moving Data From Legacy Applications (cont.)

Step 1: Place unprogrammed smart sticker on programmer
Step 2: Read 125 kHz Prox Card, data is transferred to PC
Step 3: Data is written to smart card sticker

Step 4: Affix sticker to existing 125 kHz Prox card

Workshop on Storage & Processor Card-Based Technologies
July 8th, 2003
• If legacy data is already stored in a database:
  – Can use a Dye-Sub Printer w/Smart Card Encoding to automate process
    • Unattended batch processing possible
    • Issue and personalize cards on demand
“Wedge” Readers

• Many times a keyboard “wedge” reader can be used with a contactless smart card reader instead of original legacy reader
  — Advantage is original PC application does not have to be changed at all!

• If legacy application already uses a wedge reader then it is a no-brainer to retrieve legacy data into a PC and rewrite into a contactless smart card