



Contactless Payment: Applications, Technologies and Transaction Models

Smart Card Alliance
Terminal & eTransaction Infrastructure Task Force
February 13, 2003

New Contactless Payment White Paper (Medich)

- **Target audiences**
 - Retailers and retail trade associations
 - Transit agencies
 - Media and industry analysts
- **Objectives**
 - Educate retailers and the industry about contactless payment – covering both business drivers and technology
 - Report on what's happening with contactless payment in the U.S.
 - Describe the advantages of smart cards for contactless payment

Topics & Speakers (Medich)

- **Introductions**
 - *Cathy Medich, Task Force Chair & Consultant*
- **Existing Contactless Payment Applications**
 - *Julie Krueger, VP, Infrastructure and Emerging Technology, JCB International Credit Card Co.*
- **Contactless Payment Business Benefits & Costs**
 - *Michael Madden, VP, e-Business Development, MasterCard International*
- **Contactless Payment Technology Alternatives**
 - *Jeremy Wyant, RFID Product Manager, NTRU Cryptosystems, Inc.*
- **Why Smart Cards for Contactless Payment?**
 - *Ian Duthie, Smart Card ICs Marketing Manager, Atmel*
- **Conclusions**

Existing Contactless Payment Applications (Krueger)



- **Hong Kong Octopus Card**

- Contactless smart card ticketing system for over 100 transit service providers
 - Sony FeliCa 13.56 MHz smart card technology
- Over 9M cards issued and over 7M transactions daily with a transaction value of over HK\$50M (US\$6.5M)
- Over 160 merchants accepting cards, with 10% of transactions unrelated to transport
 - Park 'N Shop, Watson's, 7-Eleven, Starbucks, vending machines, pay phones, photo booths, car park

Existing Contactless Payment Applications (Krueger)



- **ExxonMobil Speedpass**
 - RFID-based contactless key fob, wrist watch or transponder
 - Over 6M Speedpass customers
 - Used at 7500 Exxon and Mobil-branded locations for both gasoline and convenience store purchases, with expansion to other retailers
 - Stop & Shop and McDonald's (Chicago area)
 - Results: 4% sales lift for gasoline purchased after Speedpass was implemented

Existing Contactless Payment Applications (Krueger)



- **Visa contactless payment in South Korea**
 - Contactless smart card with magnetic stripe used for transit payment and credit card payments
 - 6-7M Visa-branded cards issued since 1998
 - Dual interface smart card used for transit and electronic purse applications in several major South Korean cities
 - Dual interface Global Platform smart cards adopted in 3 major districts in South Korea for transit, credit/debit payment, digital ID, e-purse and loyalty
 - Issuance starting in 2003
 - Moneta card program with SK Telecom, using infrared from mobile telephone handsets for Visa payment at the point-of-sale
 - 2-3M handsets to be deployed by end of 2003

Existing Contactless Payment Applications (Krueger)



- **MasterCard PayPass**
 - Contactless smart card
 - Using ISO/IEC 14443 to transmit Track 2 payment information via RF to specially equipped merchant terminal
 - Pilot in Orlando, Florida – announced in Dec. 2002
 - Chase, Citibank, MBNA – issuing PayPass cards
 - Participating merchants
 - Boater's World, Chevron, City of Orlando Parking, Friendly's, Loews Universal Cineplex, Ritz Camera and Wolf Camera

Contactless Payment Business Benefits & Costs: Retailer (Madden)

- **Key retail segments:** quick service restaurants, gas stations, convenience stores, parking facilities, transit services, entertainment venues, unstaffed vending locations

Retailer Benefits	Retailer Costs
<ul style="list-style-type: none">• Faster transaction times• Increased revenue from increased spending per transaction, increased frequency of purchase, and increased loyalty• Improved operational efficiencies and lower costs• Better customer information• Competitive differentiation	<ul style="list-style-type: none">• Upgrade of payment terminal hardware and software• Upgrade of retailer host systems• Transaction fees• Customer service staff training



Contactless Payment Business Benefits & Costs: Issuer (Madden)

Key Issuer Benefits	Key Issuer Costs
<ul style="list-style-type: none">• Penetration of the cash payment market• Increased customer transaction volume• Increased usage of the contactless payment device• Improved customer retention and loyalty• Co-branding with retailers• New service opportunities	<ul style="list-style-type: none">• Contactless payment device cost• Personalization and life cycle management costs• Operations costs• Transaction processing infrastructure costs• Customer service staff training

Contactless Payment Technology Options (Wyant)

- **Current primary contactless payment technologies**
 - ISO/IEC 14443-compliant 13.56 MHz contactless smart cards
 - ISO/IEC 15693-compliant 13.56 MHz contactless smart cards
 - Proprietary 13.56 MHz technology
 - For example: Sony FeliCa and Cubic Go Card
 - Low-frequency RFID
 - High-frequency RFID
- **Other contactless payment technology alternatives**
 - Infrared
 - Bluetooth
 - Near Field Communications (NFC)

Contactless Payment Technology Options: Technical Specs (Wyant)

	ISO/IEC 14443	ISO/IEC 15693	Proprietary 13.56MHz (Felica)	Low-frequency RFID	High-frequency RFID	Infrared	Bluetooth
Operational range	< 10 cm	< 70 cm	< 10 cm	<20 – 60 cm	3.5 – 10+ m	1-2 m; 20 – 30 cm	10 – 80 m
Operational orientation	Within RF range	Within RF range	Within RF range	Within RF range	Within antenna beam	Line of sight	Wide range
Data rates	106 – 424 Kbps	26 Kbps	211 Kbps	<10 Kbps	6.4 Kbps read, 320 bps write	9.6 Kbps – 4 Mbps	1 Mbps
Carrier frequency	13.56 MHz	13.56 MHz	13.56 MHz	100-500 kHz	902-928 MHz	N/A	2.4 GHz ISM band
Standards-based communications	ISO/IEC 14443 A/B	ISO/IEC 15693	No	No	No	IrDA	Bluetooth Consortium
Standards-based pmt	Visa: EMV MC: Track 2 JCB	No	JCB	No	No	Visa: IrDA variation	No
Security	Strong – short range & strong crypto processors	Moderate – longer range & less capable processors	Strong – short range and more capable processors	Weak – less capable processors	Weak – longer range & much less capable processors	Moderate – line of sight	Must be built into application
Form Factors	Card, watch, phone	Card, watch, key fob	Card	Key fob, watch, car tag	Car tag	Any IR-capable device	Any Bluetooth device

Contactless Payment Technology Options: Key Considerations (Wyant)

- What payment mechanisms can the contactless technology support? Is the technology endorsed by the financial industry?
- What technical characteristics are needed for the ideal customer experience?
 - Operational range & orientation
 - Time in field
 - Form factor
- What security features are required for the expected level of risk?
- Is the technology commercially available? Are technology components available from multiple vendors?
 - Standards-based vs. proprietary solutions
- What investment is required for implementation?
- How does the technology and payment process integrate with current infrastructure and processes?

Contactless Payment Technology Options (Wyant)

	Key Advantages	Key Disadvantages
ISO/IEC 14443-Compliant Solutions	<ul style="list-style-type: none"> • Used extensively worldwide in payment applications and in MasterCard and Visa contactless initiatives • Strongest security features • Standards-based technology, with cards and readers available from many vendors 	<ul style="list-style-type: none"> • Only limited use for payment in the U.S. • Shorter operational range than other technologies
ISO/IEC 15693-Compliant Solutions	<ul style="list-style-type: none"> • Longer operational range • Standards-based technology, with cards and readers available from multiple vendors 	<ul style="list-style-type: none"> • Perceived security risk due to longer range and less capable processors • Limited use in payment, except for closed systems
Proprietary 13.56 MHz Technology	<ul style="list-style-type: none"> • Broadly used for automatic fare collection in Asia Pacific • Strong security 	<ul style="list-style-type: none"> • Proprietary technologies, with implementations more focused in geographically limited areas • Lack of standards • No support from major payment associations
Low-Frequency RFID	<ul style="list-style-type: none"> • Used by several contactless payment vendors in US (e.g., Speedpass) • Easy to use, with variety of form factors and longer operational range 	<ul style="list-style-type: none"> • Weaker security • Proprietary technologies – typically single source per application • No support from payment associations • Lack of card form factor
High-Frequency RFID	<ul style="list-style-type: none"> • Easy for consumers to use, with long operational range 	<ul style="list-style-type: none"> • Perceived security risk due to longer range and much less capable processors • Proprietary technologies with few sources • No support from financial industry • Lack of card form factor

Why Smart Cards? (Duthie)



- Worldwide use for credit/debit payment, supported by Visa, MasterCard, JCB and American Express
 - EMV payment implementations critical to reducing card fraud globally



- Multiple application support – payment, loyalty, ID
- Highest security

- Tamper-resistance
- Extreme difficulty of counterfeiting
- Ability to use multi-factor authentication (e.g., smart cards and PIN, password or biometric)
- Strong cryptographic capabilities, protecting data and ensuring authenticated transactions
- Programmability, allowing additional security and privacy-enabling features to be implemented



Why Contactless Smart Cards for Payment? (Duthie)



- Support from all major payment associations
- Availability in card form factor
 - Consumer familiarity
 - Fit with payment device issuance process
- Standards-based technology
 - Manufacturability and choice of vendors for both cards and readers
- Highly flexible
 - Ability to support multiple applications
 - Hybrid cards (e.g., magnetic stripe and contactless interface)
- Strongest security features vs. all other contactless technologies

Conclusions (Medich)

- An increasing number of payment applications worldwide are using contactless technology -- demonstrating both consumer and retailer benefits in retail segments where convenience and speed of payment are essential.
- No dominant contactless technology is being used in the US, with several vying to become the solution of choice.
- The technology choice is complex, including technology, process and business issues.
- Smart cards offer an excellent choice, with:
 - Standards-based technology
 - Global usage for payment, and MasterCard and Visa contactless initiatives in place
 - Strong security features
 - Compatibility with existing installed infrastructure

For More Information

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The Secure Personal ID Task Force has an in-person meeting, Feb. 13, from 12:15-1:15 PM. All Alliance members are welcome to attend.