The What, Who and Why of Contactless Payments

A Smart Card Alliance Contactless Payments Council White Paper

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Introduction

The mass market introduction of contactless technology is an important event for the payments industry. Contactless payments are already providing benefits to consumers and retailers alike, in terms of higher levels of control and convenience for consumers and higher throughput for retailers. And these benefits are just the tip of the iceberg.

This paper describes the key changes associated with the use of contactless payments in North America, including the additional value such payments can provide to issuers, acquirers/ processors, independent sales organizations (ISOs), retailers, and consumers. This paper is also intended to facilitate communications among the various industry stakeholders by describing current market activities and standardizing definitions key to understanding contactless payments. All stakeholders benefit from a clear understanding of how contactless payments deliver new benefits while also leveraging the reliability and trustworthiness of current payment systems.

In 2005, the launch of contactless payments across North America began in earnest, with further growth in numbers of issuers, numbers of cards, and merchant locations. Leading banks are issuing millions of contactless credit and debit cards to consumers, and leading retailers are installing contactless readers that can accept contactless payment and are integrated with point-of-sale (POS) systems. The rate of deployment of contactless infrastructure is the highest ever observed for emerging payments products and technology in recent memory and speaks of a unique market momentum for the industry. As contactless payment adoption in the U.S. is growing, a clear understanding of its value propositions and relationship to the existing payment infrastructures is critical.

What Exactly Is Contactless Smart Chip Technology?

Contactless smart chip technology relies on a secure microcontroller or equivalent intelligence, internal memory, and a small antenna embedded in a device that communicates with a reader through a contactless radio frequency (RF) interface. This technology is used in a wide range of applications. From delivering fast, secure transactions as in transit fare payment cards to protecting personal information in government and corporate identification cards, electronic passports and visas, contactless smart chip technology is being leveraged to improve speed, convenience and security.

Contactless smart chips can securely manage, store, and provide access to data on the device in which they are embedded. They can perform internal functions (e.g., encryption) and interact intelligently with the contactless reader. Contactless smart chip technology is available in a variety of forms – plastic cards, watches, key fobs, documents, and other handheld devices, such as mobile phones. This technology is not related to "non-smart" RF chip technologies, such as the RFID tags used for inventory management/product tracking applications, which require minimal functionality.

"Contactless payments"[1] is one application of contactless smart chip technology. Contactless payments are simply payment transactions that require no physical connection between the consumer payment device and the physical POS terminal. In the United States, the term "contactless payments" refers to the use of payment products currently supported by American Express® (ExpressPay), MasterCard (MasterCard® *PayPass*™), and Visa Contactless. All three products are based on ISO/IEC 14443, the international standard for contactless smart chip

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[1] This paper deliberately omits other RF-based payment approaches such as toll transponders or proprietary solutions such as ExxonMobil SpeedPass. It also omits mobile/wireless payments based on Near Field Communication (NFC) technology.

technology.[2] Contactless payment devices are restricted to be read within 2 to 4 inches of a POS terminal vs. RFID tags which are designed to be read at large distances. In addition, contactless payment applications include other measures that are specifically designed to protect the security of the consumer's information and the payment transaction.

Why Use Contactless Payments?

Just what are the advantages of contactless payments over other methods of payment – magnetic stripe cards and cash? Why are merchants moving to deploy this new form of payment? Why are consumers willing to change the way they pay? The answer is speed and convenience, as has been substantiated in the early implementations and in recent market research. Consumers no longer have to fumble with cash and change or worry about having enough cash for a purchase—they can place their contactless payment device in close proximity to a reader and go. In most cases, they do not even have to sign a receipt or enter a personal identification number (PIN).

As a result, merchants see sales volumes increase and transactions speed up. Chase has reported that time at the POS is reduced 30 to 40% and an American Express study found contactless transactions to be 63% faster than cash and 53% faster than using a traditional credit card. Research also shows that consumers generally spend more per transaction when they don't use cash – with Chase reporting a 20 to 30% increase over cash purchases. Merchants also enjoy lower costs, as a result of fewer requirements to handle cash, improved operational efficiencies, and reduced maintenance required by contactless readers. In merchant segments where speed and convenience are key to merchandising and customer service, contactless payments also translate into improved customer acquisition and retention.

By issuing secure contactless payment devices, financial service providers are not only supplying consumers with a more convenient payment mechanism, they are also increasing transaction volumes by replacing cash. In addition, service providers can now differentiate themselves with innovative new form factors.

In the long term, contactless cards and tokens enable merchants and issuers to collaborate on lifestyle products that blend the features (e.g., security, convenience, special offers), packaging (e.g., cards, tokens, personal devices, mobile phones), and delivery of payment products into a variety of product types targeting different cardholder segments that have specific desires for their shopping experience.

What Current Market Activities Are Attracting Attention?

Over the past year, quite a buzz has surrounded the contactless payments market. Multiple card issuers have announced rollouts and follow-on issuance of contactless cards and devices in the United States. Since 2005, issuers have been rapidly expanding their market presence, with over 17 million cards issued[3]. Highlights of contactless payment deployment include the following:

- JPMorgan Chase has deployed contactless "blink" credit and debit cards in multiple major metropolitan areas, including Atlanta, Denver, Orlando, Philadelphia and New York City. The Chase blink card is based on the Visa and MasterCard contactless payment technologies. More than 7 million Chase credit and debit cards with "blink" have been issued.

- American Express started nationwide issuance of new Blue Cards with ExpressPay contactless payment technology in 2005, with more than 2 million cards issued to date.

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[2] In countries where payment cards are migrating to contact smart card technology, contactless payment implementation requires a dual-interface smart card allowing payment in both contact and contactless modes.

[3] Card Technology, August 2006

- Bank of America (through the acquisition of MBNA) is issuing its affinity credit cards, targeting specific sports stadiums in multiple cities. The card is based on MasterCard *PayPass* contactless technology.

- Citibank is issuing debit cards and key fobs with MasterCard *PayPass* contactless technology, with plans to issue 2.5 million contactless devices.[4]

- Keybank has issued more than 2.5 million debit cards[5] with MasterCard *PayPass* technology, replacing its entire debit portfolio.

- HSBC Bank is issuing more than 1 million new debit cards that feature MasterCard *PayPass* contactless payment technology to new and existing customers.

- Citizens Bank is issuing new and replacement debit cards with MasterCard *PayPass* contactless payment technology.

- Wells Fargo Bank is issuing credit cards with Visa Contactless capability and is expecting over 400,000 cards to be in the market by end of 2006.[6]

- Meijer Stores has added MasterCard *PayPass* technology to nearly 1 million Meijer cards since last fall.[7]

The card issuers are not going it alone. Many of the nation's top national and regional retailers have either enabled or are in the process of enabling their POS systems to accept contactless payment cards and key fobs. Over 35,000 merchant locations have been enabled to accept contactless payment devices.

Top retailers who are accepting contactless payments at all of their store locations in the United States include:

- 7-Eleven, Inc.
- Boater's World Marine Centers®
- CVS/pharmacy®
- Jack in the Box®
- McDonald's®

- Regal (Theaters) Entertainment Group
- Meijer Stores
- Ritz Camera
- Sheetz
- Wawa

Many medium-sized and smaller merchants are being assisted by acquirers and ISOs so that they can begin accepting contactless payments shortly. Plus, a long list of well-recognized retailers are accepting contactless payments at some or all their store locations in cities or regions where issuers have focused contactless payment device issuance. The list includes:

- AMC Theaters®
- Arby's®
- Carl's Jr.®
- Cold Stone Creamery®
- Duane Reade
- Eckerd

- Good Times Burger
- KFC
- RaceTrac
- Subway®
- United Artist Theaters
- Walgreens

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[4] CIO Today, July 3, 2006
[5] "Keybank speeds up cafeteria lines with Sharp contactless POS system," Contactless News, July 17, 2006
[6] Cardline, September 26, 2006
[7] Cardline, September 2006

Another form of retailing, major sports stadiums and entertainment venues, are being enabled to accept contactless payments. Sports fans and event attendees can obtain contactless cards and key fobs with their favorite sports logo. Bank of America is issuing *PayPass*-enabled branded affinity cards for multiple Major League Baseball and National Football League teams that let fans speed through concession lines. At some stadiums, certain lines are dedicated to this new form of payment.

A number of pilots have also been launched that feature more innovation in the use of contactless payments.

- In New York City, MasterCard and Citibank are working with the Metropolitan Transportation Authority – which operates the NYC transit system – to conduct a contactless payment trial at subway turnstiles to pay for access directly on the train.

- Cingular Wireless, Nokia, JPMorgan Chase, Philips, Visa and ViVOtech recently completed a pilot in Atlanta, Georgia, where contactless payment was implemented using mobile phones powered by Near Field Communication (NFC) technology – an RF technology that is compatible with that used in American Express, MasterCard, and Visa contactless payment devices. The system was used at Philips Arena, home of Atlanta area basketball and hockey teams. According to Visa, trial participants overwhelmingly embraced the technology and expressed that the mobile device and applications significantly improved their arena experience.

- MasterCard, in partnership with Nokia and 7-Eleven, is now conducting a consumer trial in Dallas, Texas, of NFC-enabled mobile phones with MasterCard *PayPass* capability. Participants from the 7-Eleven Speak Out™ wireless program will get NFC-enabled Nokia 3220 mobile phones and instructions on how to wirelessly enhance them with MasterCard *PayPass* payment functionality. The phones can then be used to make purchases at any of the merchant locations worldwide that accept MasterCard *PayPass*.

From new form factors, such as phones and watches, to new credit and debit card acceptance locations, such as vending machines, contactless payment technology is fueling innovation in the payments industry.

Are Contactless Payment Cards and Transactions Secure?

Contactless payment, as implemented by American Express, MasterCard and Visa, is secure. The financial payments networks used to process contactless payments are the same networks that process millions of magnetic stripe transactions securely today.

The financial payments industry has designed multiple layers of security throughout the traditional credit and debit payment systems to protect all parties involved in a payment transaction. Most of these protective measures are independent of the technology used to transfer the consumer payment account information from the payment card or device to the merchant POS terminal and are used for both magnetic stripe and contactless transactions. For example, online authorization, risk management and fraud detection systems are used to detect potential fraudulent activity for any credit or debit card payment transaction. Plus, the liability policies which protect consumers for traditional consumer credit and debit accounts also apply to American Express, MasterCard and Visa contactless transactions.

For contactless payments, the financial industry also uses added security technology, both on the contactless device as well as in the processing network and system, to prevent fraud. While implementations differ among issuers, examples of security measures that are being used include the following.

- At the card level, each contactless card can have its own unique built-in secret "key" that uses standard 128-bit encryption technology to generate a unique card verification value or a cryptogram that exclusively identifies each transaction. No two cards share the same key, and the key is never transmitted.

- At the system level, payment networks have the ability to automatically detect and reject any attempt to use the same transaction information more than once. Thus, even if a fraudster should "read" information from a contactless transaction, or even multiple transactions from the same card, this information would be useless.

- The processing of contactless payments does not require the cardholder name to be exchanged between card and terminal. In fact, best practices being used within the industry do not include the cardholder name in the contactless chip.

- Some contactless payment cards and devices do not include the cardholder's account number, but use an alternate number that is associated with a payment account by the issuer's backend processing system. This alternate number would not be able to be used in other payment transaction (e.g., with a magnetic stripe card or on the Internet).

In addition, cardholders control both the transaction and the card throughout the transaction. Cardholders do not have to surrender either a card or their account information to a third party during a contactless transaction and contactless payment devices are designed to operate at very short ranges – less than 2 to 4 inches – so that the consumer needs to make a deliberate effort to initiate the payment transaction.

What Does It All Mean?

Even at this early stage, the evidence shows that contactless payments have the strong potential for rapid adoption in the U.S. Contactless payments offer a new, safe way to pay that not only provides benefits to consumers, merchants, and issuers, but also opens the door to new form factors and related value-added applications. Contactless payments allow creativity and differentiation to flourish on the foundation of the mature card industry.

Contactless payments are the most important card payment innovation in the last decade, with early adoption on the part of many major card issuers and top-brand merchants, and investments by and cooperation with the card associations. Significant numbers of contactless cards are being issued, the number of accepting merchant locations is increasing rapidly, and consumer usage is steadily increasing.

Contactless payments are safe, secure, and convenient. Although based on chip-level RF technology, contactless payment technology is fundamentally different from RFID and is built from the ground up on requirements for high security. Contactless payment devices use sophisticated smart chip technology with built-in intelligence and multiple safeguards specifically designed to protect against fraud. Built on the current payment infrastructure, contactless payments leverage layered security systems and deliver clear value propositions to all stakeholders. Consumers enjoy the convenience, merchants realize faster checkout times and increased throughput, and issuers achieve increased activation rates and usage.

Over the coming year, significant growth is expected in the adoption and use of contactless payments in the U.S. Other market innovations made possible by the use of smart chip technology, such as loyalty, rewards, and other value-added offerings, are already emerging alongside contactless payments. A new era of payment has begun in the United States.

Resources

- Contactless Payment Resources (http://www.smartcardalliance.org/pages/activities-councils-contactless-payments-resources), updated news and resources about contactless payments from the Smart Card Alliance
- Contactless Payments: Consumer Attitudes and Acceptance in the United States (http://www.smartcardalliance.org/pages/publications-contactless-payments-attitudes-acceptance), Smart Card Alliance and Javelin Strategy & Research report, November 2006
- Contactless Payments: Delivering Merchant and Consumer Benefits (http://www.smartcardalliance.org/pages/publications-contactless-payments-benefits-report), Smart Card Alliance report, April 2004
- Smart Card Alliance Contactless Payment Security Statement (http://www.smartcardalliance.org/pages/publications-contactless-payment-security-statement)
- Smart Card Alliance Contactless Payments Council (http://www.smartcardalliance.org/pages/activities-councils-contactless-payments)
- Smart Card Alliance Contactless Payments Security Q&A (http://www.smartcardalliance.org/pages/publications-contactless-payment-security-qa)

About the Smart Card Alliance

The Smart Card Alliance is a not-for-profit, multi-industry association working to stimulate the understanding, adoption, use and widespread application of smart card technology. Through specific projects such as education programs, market research, advocacy, industry relations and open forums, the Alliance keeps its members connected to industry leaders and innovative thought. The Alliance is the single industry voice for smart cards, leading industry discussion on the impact and value of smart cards in the U.S. and Latin America. For more information please visit http://www.smartcardalliance.org.

About the Smart Card Alliance Contactless Payments Council

The Contactless Payments Council (http://www.smartcardalliance.org/pages/activities-councils-contactless-payments) is one of several Smart Card Alliance technology and industry councils. The Contactless Payments Council was formed to focus on facilitating the adoption of contactless payments in the U.S. through education programs for consumers, merchants and issuers. The group is bringing together financial payments industry leaders, merchants and suppliers. The Council's primary goal is to inform and educate the market about the value of contactless payment and work to address misconceptions about the capabilities and security of contactless technology. Council participation is open to any Smart Card Alliance member who wishes to contribute to the Council projects.

APPENDIX: Glossary of Contactless Payments Terms

- **Contactless smart chip.** An integrated circuit (IC) that includes a secure microcontroller or equivalent intelligence and internal memory, and communicates with a reader through a radio frequency (RF) interface. Contactless smart chip technology, a form of proven smart card technology, is used increasingly in applications that must protect personal information and/or deliver fast, secure transactions. Leveraging many years of smart card security developments, contactless smart chips have the ability to store, protect, manage, and provide access to secure data and to support the security protocols and algorithms required by an application. In addition, contactless smart chip technology delivers the convenience, durability, and reliability required by applications that must support fast transaction throughput in demanding environments. The contactless interface provides users with the convenience of allowing the contactless device to be read at short distances with fast transfer of data. Contactless smart chip technology is available in a variety of forms – plastic cards, watches, key fobs, documents, and other handheld devices such as mobile phones.

- **Dual-interface smart chip.** A single smart chip that has two interfaces – contact and contactless – and shares memory and chip resources. A payment card with a dual-interface smart chip can be used with either a contact reader (where the card is inserted into the reader) or with a contactless reader (where the card is tapped on or waved close to the reader).

- **Encryption.** The process of translating information into a code that can only be read if the reader has access to the key that was used to encrypt it. There are two main types of encryption – asymmetric (or public key) and symmetric (or secret key).

- **Form factor.** The physical device that contains the contactless smart chip and antenna and that is used by the consumer for payment. Contactless payment devices can come in a variety of form factors, including plastic cards, key fobs, wristbands, wristwatches, PDAs, and mobile phones.

- **ISO/IEC 14443.** The international standard for contactless smart chips and cards that operate (i.e., can be read from or written to) at a distance of less than 10 centimeters (4 inches). American Express, MasterCard, and Visa contactless payment devices are based on this standard.

- **Microcontroller.** A highly integrated computer chip that contains all the components comprising a controller. Typically this includes a central processing unit (CPU), random access memory (RAM), some form of read-only memory (ROM), input/output ports, and timers. Unlike a general purpose computer, a microcontroller is designed to operate in a restricted environment.

- **NFC – Near Field Communication.** A short-range wireless standard (ISO/IEC 18092) that uses magnetic field induction to enable communication between devices when they are brought close together (within 10-20 centimeters or 4-8 inches). NFC technology is compatible with ISO/IEC 14443-based technology.

- **Range.** The distance from which a contactless payment device can be read. American Express, MasterCard and Visa contactless payment devices are designed to comply with the international standard, ISO/IEC 14443, that restricts the device range to less than 4 inches (10 centimeters).

- **Reader.** The electronic device that connects to, provides power to and communicates with a contact or contactless smart card. Contactless readers generate in electromagnetic field. When a contactless device is brought into the reader's electromagnetic field, the contactless smart chip is powered on, a wireless communication protocol is established between the card and reader, and data can then be exchanged. For contactless payments, contactless

readers used at merchant locations integrate with point-of-sale terminals and comply with the ISO/IEC 14443 international standard.

- **Radio frequency (RF).** Any frequency within the electromagnetic spectrum associated with radio wave propagation. Many wireless communications technologies are based on RF, including radio, television, mobile phones, wireless networks and contactless payment cards and devices.

- **RFID tag.** Simple, low-cost and disposable electronic devices that are used to identify animals, track goods logistically and replace printed bar codes at retailers. RFID tags include an integrated circuit that typically stores a static number (an ID) and an antenna that enables the chip to transmit the stored number to a reader. When the tag comes within range of the appropriate RF reader, the tag is powered by the reader's RF field and transmits its ID to the reader. There is little to no security on the RFID tag or during communication with the reader. Typical RFID tags can be easily read from distances of several inches (centimeters) to several yards (meters) to allow easy tracking of goods.

- **Smart card.** A device that includes an embedded integrated circuit that can be either a secure microcontroller or equivalent intelligence with internal memory or a memory chip alone. The card connects to a reader with direct physical contact or with a remote contactless RF interface. With an embedded microcontroller, smart cards have the unique ability to store large amounts of data, carry out their own on-card functions (e.g., encryption and digital signatures) and interact intelligently with a smart card reader. Smart cards are available in a variety of form factors, including plastic cards, Subscriber Identification Modules (SIMs) used in GSM mobile phones, and USB-based tokens.

- **Transponder.** A wireless communications device that detects and responds to an RF signal.