The Future of Payment Technologies

Learn about the impact of EMV and Contactless Payments on merchants and consumers and future payment technologies.

White Paper

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Introduction of New Payment Technologies

A number of significant developments in the world of payments technology have emerged this year that present consumers with newer, more convenient and more secure ways to make financial transactions using credit cards and mobile payment systems. A primary driver toward the use of digital-based transaction technologies is the growing U.S. adoption of EMV chip-enabled cards.

Equally important, increasingly widespread use of a variety of technologies by device companies, payment processors and POS equipment manufacturers is providing new channels for customers to make secure payments more easily. These technologies include NFC, tokenization, biometrics and QR codes.

Not the least of the new developments has been the concurrent launch of Apple Pay™, which is blazing a trail for the payments processing industry to follow as additional high-tech payment methods materialize.

Besides speed and convenience, these new technologies are providing fundamental benefits to all stakeholders in the payments processing ecosystem including banks, processors, service providers, retailers, and most importantly consumers via meaningful reductions in credit card and e-payment fraud and reduced costs.

For the short-term, however, the emergence of these mobile payment methods is creating confusion and disruption throughout the industry especially for consumers who are dealing with varying payment mechanisms and procedures at checkout. Processing service providers would like to support as many as possible, but at this time it is not clear, except for the case of EMV cards, which one of these will remain viable over the long haul.

Two things are certain, however, which is that the familiar credit/debit card magnetic strip swipe at the checkout counter is soon to become extinct, and the follow-on effects of secure, digital mobile payment systems are just beginning to be felt.

Increasing Use of EMV Chip-Enabled Cards

Credit cards with embedded smart chip technology have been in widespread use throughout much of Europe and other parts of the world for many years. However, the U.S. in particular has been slow to adopt the technology until recently. A mandate from the industry consortium behind EMV, EMVCo, that shifts fraud liability toward merchants and payment service providers is changing that now.

What is the EuroPay/MasterCard/Visa Chip-Card Standard?

The EMV standard is named for its three biggest players, but is actually supported by other well-known industry names including American Express, JCB and China Union Pay. Its primary purpose is to increase cardholder security and make card counterfeiting an unprofitable activity by eliminating the acquisition of customer and card-specific data. The most visible change to consumers is the physical embedding of a smart chip approximately 80mm square in the credit card.

This chip has the capacity to store far more information than magnetic strips. It also has limited computational capabilities. Due to strong cryptography and key management, it is nearly impossible to hack or duplicate the stored information in the chip.

When presented to an EMV-enabled terminal, the chip-terminal data exchange significantly increases in-depth authentication and authorization procedures by service providers and banks. Furthermore, the transaction data produced by the chip is single-use versus the fixed data on a magnetic strip. Acquisition of data generated by an EMV card is useless for subsequent transactions, which makes fraudulent usage unprofitable.

EMV technology can be used for transactions when the POS reader is offline as well, since it can compare the cardholder's PIN to the identical PIN held by the smart chip. Both merchants and payment service providers are allowed to set limits on the number of offline transactions and transaction amounts per card for further protection.

Worldwide EMV-Based Payment Acceptance

Current EMV adoption throughout the leading countries in Europe approaches 100 percent. Throughout Canada and Latin America, adoption exceeds 83 percent followed closely by countries in Africa and the Middle East. In Asia, where debit cards are more widely used than credit cards, adoption is below 20 percent. However, until recently, adoption of EMV in the U.S. had been at only one percent.

U.S. EMV Uptake Is Rising

Mid-2012, EVMCo issued plans to migrate from magnetic strip cards to EMV cards in the U.S. Incentive was provided for the migration through a liability shift for fraud from card issuers to merchants or payment acquisition services, which are EMV non-compliant. Most of these liability shifts were scheduled for October 2015 except for fuel vendors, who have two more years to comply.

Merchants who adopt EMV can also avoid PCI-DSS audits, which saves them time and money. Further pressure to adopt comes from U.S. cardholders who travel abroad because of the inconvenience of using non-EMV cards in countries where adoption is widespread and magnetic strip-only cards may be refused.

Aite Group estimates that by the end of 2015 59 percent of POS terminals will be EMV compliant and half of U.S. credit cards will contain EMV chips. This estimate is in line with data from other markets who have transitioned to EMV. It typically takes several more years to achieve 90 percent conversion rates.

Worldwide EMV-Based Payment Acceptance

EMV cards are read by an EMV-enabled reader, but a PIN or signature is required in addition to the card. Whether a PIN or signature is needed may be determined by the card provider, POS terminal capability or customer preference. PINs or signatures often have differing ranks in terms of cardholder verification methods. In the U.S., it appears that Chip and Signature will be the default method even though it represents a less secure verification than Chip and PIN.

Contact and Contactless Payments

Most EMV cards issued in the U.S. will be contact cards, but instead of swiping them through a reader, they will be "dipped." That is, they are inserted into a reader slot where data flows between the chip and the payment system to verify the card and create the one-time encrypted data set required to complete the transaction. The card must remain in the reader long enough to complete this process, which takes slightly longer than the swipe method.

Contactless cards take advantage of Near-Field Communication, or NFC, which is a radio-frequency based exchange protocol. With these types of cards, the customer only needs to tap the card against the reader to initiate the transaction verification and authorization process.

Not all EMV cards support both types of interface, since both dual-interface cards and POS terminals cost more. However, customer preference for contactless payment is driving their adoption. Furthermore, since contactless/NFC transactions are part of the EMV standard, the method can be extended to other devices such as smartphones, which provides further impetus for installing contactless POS equipment. Contactless technology can be extended to ATMs as well.

EMV's Impact on Fraud

Reduction of Card-Present Fraud

Experience with EMV in Europe and other regions demonstrates that EMV produces a marked reduction overall in card-related fraudulent activity, especially with regard to card-present fraud. However, there is typically a smaller rise in card-not-present fraud and more labour-intensive e-mail or voice phishing schemes after EMV adoption is well-established. Banks are countering these and newer fraud schemes via more sophisticated fraud detection systems that evaluate data from multiple customer channels.

Tokenization to Eliminate Retailer Database Hacks

Tokenization replaces sensitive information with an insensitive representation of that data. Breaches of large retailer databases of customer credit card information are significantly mitigated when those retailers tokenize customer data per the EMV standard.

In credit card transactions, the most sensitive data is the Primary Account Number of a cardholder. Using EMV, the PAN is tokenized immediately within the security-hardened POS terminal. Only the token is subsequently used throughout the payment system to complete the transaction. Furthermore, transmission of the token is done using high standards of encryption.

Anyone intercepting such a token would find it impossible to reverse engineer the original data from which it was derived. That can only be done within a back-end, secure tokenization system. Furthermore, the use of such tokens is limited to the immediate time and space surrounding the transaction. Thus, even if access was gained to a database of card transactions, if they are tokenized then the data acquired has no value.

Mobile Payment Systems

Wireless Transaction Technology

NFC technology is the core of most current smartphone e-payment capabilities. It has been in use for two decades in the form of building keys, electronic passes and automobile key fobs that lock/unlock car doors and act as keyless ignition switches. It can be used for contactless EMV cards and added to everyday mobile devices as well, such as phones and tablets. Other radio-based media are or soon will be in use such as Bluetooth, WiFi or cellular networks for accepting and processing mobile payments.

Apple Pay™

Apple Pay has enormous potential as a game changer in the world of mobile payments, especially coming on the heels of the transition to EMV cards in the U.S. It relies on the NFC capability and onboard secure storage of the iPhone 6 and iPhone 6 Plus. It is compatible with standard NFC POS terminals, but verifies the cardholder using the Touch ID fingerprint scanner that is part of the phone instead of a PIN or signature.

Users can register multiple credit/debit cards and choose which one to use at the time of each payment transaction. Tokenization creates a one-time Device Account Number to ensure no sensitive data are stored within the processing system. The token is stored securely within the phone's Secure Element or SE. The SE can be part of the phone's memory or embedded within a SIM card.

The addition of biometric authentication adds an additional layer of security, which makes Apple Pay a better technology for both the smallest and largest transactions without hit-and-miss per-transaction monetary limits. In combination with the IPhone's passbook, it also enables secure, tokenized online purchases.

Google Wallet

Google introduced their mobile payment system, Google Wallet, three years ahead of Apple Pay, but usage quickly reached a plateau. It used an SE on the SIM, which was blocked by carriers wishing to implement their own proprietary e-wallets.

Later, Google Wallet utilized host-card emulation to get around the use of the SIM, but it has had several security issues including the lack of card data tokenization that have reduced customer trust. Furthermore, Google's overall commitment to the project seems lukewarm at this point.

CurrentC

CurrentC is an alternative mobile payments app being developed by a collection of big retailers spearheaded by Wal-Mart who wish to avoid Merchant Customer Exchange fees of two to three percent per transaction by utilizing ACH transfers instead.

Instead of NFC, the authentication is based on visual QR codes. Either the customer scans a QR code into their phone from a checkout screen or the cashier scans a QR code presented by the phone. The phone must be unlocked and the CurrentC app opened before the QR code is presented.

So far, this method, which appears rather clunky compared to Apple Pay, is not receiving accolades from consumers. The fact that transactions are made to and from customers' bank accounts via ACH is also not terribly popular. This severely limits the channels that consumers to one and they miss the loyalty discounts or cash-back offers from their card issuers.

It is also unclear if the advantage of using ACH over MCX transactions is substantial enough for retailers to maintain, since CurrentC requires proprietary POS terminals and the consortium must supply back-end infrastructure and procedures, such as dispute resolution and chargebacks, themselves.

Future E-Payment Technologies and Usage

Non-card mobile payments as represented by Apple Pay and other proprietary e-wallets demonstrate the potential for new ways to make transactions, but these represent only a thin wedge into an ever-expanding universe of financial transaction processing methods, some of which are unconventional and intertwined with other online activities.

IoT

MasterCard has announced a new initiative as part of their MasterCard Digital Enablement Service and Digital Enablement Express programs that will embed contactless payment capability within the nascent Internet of Things including wearable devices, key fobs, cameras, appliances and apparel.

Furthermore, more and more apps and social media are linking to user's credit cards to enable secure payments to friends, family or businesses.

Branch-less Banking Services

Mobile payments systems are inspiring new models of banking as well. In Kenya and Tanzania, Vodafone created a virtual, branch-less money transfer and micro-financing service called M-Pesa that has since expanded to South Africa, India and Eastern Europe.

Users deposit money into an account stored on their phone, which can be spent using PIN-based SMS messages to individuals or businesses or converted to cash. Already it has 17 million users in Kenya alone and is being lauded for bringing financial services to the masses and reducing crime in that country.

Biometrics

Acuity Market Intelligence recently predicted that the 65 percent of all mobile payments will be aided by biometrics authentication by 2020. Adoption of biometrics for

transaction authentication is experiencing a CAGR of 67 percent over that time period.

The types of biometrics being studied by MasterCard, Samsung, Alibaba and others go beyond fingerprints. The techniques under evaluation include voice, facial and eye recognition.

Benefits of New Payment Technologies

EMV

For U.S. merchants, becoming EMV-compliant reduces fraud exposure while providing additional convenience and confidence to their customers. Especially for those merchants who have high customer turnover, such as coffee shops, choosing to support dual-interface EMV payments reduces the time customers spend in lines. Such terminals are ready to accept other NFC payment methods as well, which further increases customer satisfaction.

Furthermore, as consumers become aware of the unique security benefits of tokenization present in EMV and other e-payment systems, their trust increases, which leads to increased use of mobile payments as opposed to cash, checks or mag-strip cards.

Omni-Channel Transactions

As new payment technologies come on-line, especially those that comply to established standards, customers benefit from the ability to pay through multiple channels of their choosing: offline, online, via apps, using a variety of devices and with various payment methods.

Added Convenience for Small Transactions

The convenience of remote, mobile payment systems benefits both customers and merchants when the physical point of payment can be almost anywhere on the premises. Payment for a restaurant meal can be made at the customer's table via their smartphone and the waiter's portable tablet for instance. Pre-payment for pick-up items can be made

by customers even before they arrive at a brick-and-mortar outlet.

Additionally, contactless payments are easier to apply to those many smaller transactions that consumers encounter every day such as buying a newspaper, a drink or a bus ticket from an unattended booth or machine. This saves both merchants and customers time and money. This opens a door to possible fraud, but that is eliminated using biometrics or mitigated by limiting the value of micro-transactions.

Integration with Value-Add Services

As POS systems go digital and their ease-of-use for both merchants and consumers improves, POS providers are adding on services to provide actionable data to merchants and increase customer tie-in. At the time of purchase, for instance, an e-mail receipt can be provided, which opens a channel to offer customers loyalty rewards or special offers.

A retailer's POS system is also the logical place from which to track and order inventory while providing detailed sales analytics that assist in fine-tuning staffing schedules and increasing profits. Larger companies can utilize collected data, anonymously of course, to improve their Big Data analytics across product lines.

Barriers to Adoption of Mobile Payments

The two largest obstacles to more rapid uptake of mobile payment systems stem from overcoming the inertia of both merchants and consumers. On the merchant side, this is demonstrated by the procrastination of half of U.S. retailers to adopting EMV despite the missed benefits and substantial risk of not doing so.

On the other hand, a large percentage of consumers still do not perceive a need for mobile payments or do not understand the benefits of using these methods, especially regarding the improvements in security. Such obstacles are common when new technologies emerge.

Another significant factor slowing down both development and adoption of mobile payments is the current fragmentation in technology approaches, which requires consumers to navigate multiple payment mechanisms.

EMV contact cards have the smallest hurdle to jump in this regard, followed by contactless cards and Apply Pay, which are different but more convenient. Solutions that are retailer-centric versus customer-centric, such as CurrentC, will have to jump the highest to stimulate adoption.

Summary

In terms of the near future, EMV card technology is a done deal in the U.S. Half of merchants have converted and hundreds of millions of chip-enabled credit cards are already being issued to cardholders.

As EMV paves the way in the U.S. toward a greater awareness of digital payment security and convenience benefits, it will likely increase uptake for other mobile pay systems as a side effect. Regardless of how quickly contactless, biometric-based and new mobile-based financial systems are developed, however, their proliferation is sure to accelerate and in ways we cannot yet imagine.

The entire payments processing industry seems poised at an inflection point that will take it well beyond the relatively incremental pace that EMV represents. In developing countries, we will probably witness technology leap-frogging such as when many regions bypassed wired telecommunications systems for wireless technology. The same could happen regarding mobile payments and the case of M-Pesa in Africa may be the first example.

However the mobile payments ecosystem develops, it will only be successful if it addresses foremost customer needs and trust. Once trust is present, consumers will be more than open to the many benefits and conveniences that potentially await as e-wallets and mobile transactions become ubiquitous throughout the world.