



**Smart Card
Alliance**

***The Changing U.S. Payments Landscape:
Impact on Payment Transactions at Physical
Stores***

A Smart Card Alliance Payments Council White Paper

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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>.

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TABLE OF CONTENTS

1	INTRODUCTION	4
2	PHYSICAL POS PURCHASE TRANSACTIONS.....	5
2.1	TRADITIONAL U.S. CARD-PRESENT PAYMENT TRANSACTION MODEL.....	5
2.2	U.S. PAYMENTS INDUSTRY EVOLUTION.....	5
2.2.1	<i>Historical Changes</i>	<i>5</i>
2.2.2	<i>Current Changes</i>	<i>6</i>
2.2.3	<i>EMV Migration</i>	<i>7</i>
3	PAYMENTS INNOVATIONS	8
3.1	NEAR FIELD COMMUNICATION TECHNOLOGY.....	8
3.1.1	<i>NFC in the Payments Environment</i>	<i>8</i>
3.1.2	<i>Technology Benefits.....</i>	<i>9</i>
3.1.3	<i>Impact on the Traditional Payments Landscape.....</i>	<i>10</i>
3.2	MOBILE PAYMENT CARD READERS.....	10
3.2.1	<i>Mobile Card Readers in the Payments Environment</i>	<i>11</i>
3.2.2	<i>Technology Benefits.....</i>	<i>12</i>
3.2.3	<i>Impact on the Traditional Payments Landscape.....</i>	<i>12</i>
3.3	TABLET POS.....	12
3.3.1	<i>Tablet POS in the Payments Environment</i>	<i>13</i>
3.3.2	<i>Technology Benefits.....</i>	<i>15</i>
3.3.3	<i>Impact on the Traditional Payments Landscape.....</i>	<i>15</i>
3.4	GEOLOCATION PURCHASING.....	16
3.4.1	<i>Geolocation in the Payments Environment</i>	<i>16</i>
3.4.2	<i>Technology Benefits.....</i>	<i>16</i>
3.4.3	<i>Impact on the Traditional Payments Landscape.....</i>	<i>16</i>
3.5	2-D BARCODES	17
3.5.1	<i>2-D Barcodes in the Payments Environment.....</i>	<i>17</i>
3.5.2	<i>Technology Benefits.....</i>	<i>18</i>
3.6	ACH AT THE POS.....	18
3.6.1	<i>ACH in the Payments Environment.....</i>	<i>19</i>
3.6.2	<i>Technology Benefits.....</i>	<i>19</i>
3.6.3	<i>Impact on the Traditional Payments Landscape.....</i>	<i>20</i>
3.7	REMOTE ORDERING	20
3.7.1	<i>Remote Ordering in the Payments Environment</i>	<i>20</i>
3.7.2	<i>Technology Benefits.....</i>	<i>22</i>
3.7.3	<i>Impact on the Traditional Payments Landscape.....</i>	<i>23</i>
3.8	OTHER PAYMENTS INNOVATIONS	23
4	KEY QUESTIONS AND CONSIDERATIONS	25
4.1	CONSUMER PRIVACY	25
4.2	SECURITY	26
4.3	EMV MIGRATION	27
4.4	PAYMENT INNOVATIONS AND CARD-NOT-PRESENT TRANSACTIONS	28
4.5	MERCHANT CONSIDERATIONS.....	29
5	CONCLUSIONS.....	31
6	PUBLICATION ACKNOWLEDGEMENTS.....	32

1 Introduction

This is an exciting time in the U.S. payments industry, with innovation in both payment presentment and acceptance. Significant changes to the U.S. payments landscape affect how merchants accept payments for purchases at physical stores, as well as how consumers interact with merchants to select and pay for products.

Mobile devices now not only support payments but also enable new services that add value for both consumers and merchants. Different payment approaches are starting to remove the requirement for a payment card at the point-of-sale (POS), leveraging cloud-based services or mobile devices. In addition, the U.S. is beginning to migrate to the use of secure EMV contact and contactless technology to enhance security, reduce fraud, ensure global interoperability, and lay the foundation for future innovations in payments.

The Smart Card Alliance Payments Council developed this white paper for the U.S. payments community. The white paper describes payments innovations that affect the physical POS and examines the impact of the pending migration to EMV on these new payment solutions. The white paper focuses on the technologies used by consumers to present payment credentials at a physical POS and by merchants to accept payment.¹

This white paper discusses a variety of new technologies and payments approaches, including Near Field Communication (NFC), mobile payment card readers (also known as dongles), tablet POS devices, geolocation, 2-D barcodes, ACH payment, and remote ordering. The white paper reviews these innovations, describes their use, advantages and disadvantages, and effects on the traditional payments landscape, and identifies examples of solution providers for each technology or approach. While new technology typically facilitates progress, it also incurs risks and concerns in areas such as consumer privacy and data security. The white paper concludes with a discussion of the potential effects of these solutions on consumer privacy, transaction security, and the merchant POS process. It also considers how EMV migration may affect implementation.

As the payments community moves forward with infrastructure changes and POS system upgrades, understanding key technology trends is critical to implementation of next-generation approaches for payment in the U.S.

¹ The white paper does not consider person-to-person payments or e-commerce transactions, in which consumers order and pay for a product at an Internet merchant's web site for shipment to locations other than the merchant's physical store.

2 Physical POS Purchase Transactions

The U.S. payments industry consists of nearly 6 million merchants.² When merchants with low transaction volumes (such as artisans, street performers and other non-traditional merchants) are included, that number balloons to approximately 30 million.³ The amount of commerce taking place each day is substantial and with so much commerce taking place, it is easy to see why the POS system has become such a staple in the U.S. payments industry.

2.1 Traditional U.S. Card-Present⁴ Payment Transaction Model

In 2012, more than 70 billion⁵ card purchase transactions took place with merchants in the U.S. The majority of the transactions that occurred at a physical merchant location typically followed the “traditional” transaction model below.

1. A consumer shops for merchandise.
2. The consumer takes the selected merchandise to a checkout counter.
3. The merchant scans the items and conveys a payment total to the consumer.
4. The consumer selects a card (credit, debit, prepaid) to use for payment.
5. The card is swiped through a terminal and cardholder verification (e.g., PIN or signature) is provided. In some situations, where the transaction value is below a specified amount, no cardholder verification is required.
6. The merchant prints a receipt for the consumer, and the transaction is complete.

While this process may be modified slightly to support the unique requirements of certain merchant categories (e.g., restaurants, transit), it has been part of the American payment culture for decades.

2.2 U.S. Payments Industry Evolution

Simplifying the checkout process and integrating new tools and functionality have always been of interest to participants in the payments value chain. Over time, the POS process has changed considerably. Past POS innovations, such as the cash register, the credit card and the PIN pad, were motivated by the desire to simplify processes, increase convenience, enhance security and lower costs. These same driving forces are behind developments that are beginning to change the landscape again.

2.2.1 Historical Changes

The first cash register was introduced in the late 19th century. The cash register allowed merchants to track purchases and guard against employee theft. A decade later, the register was upgraded to include a paper roll that tracked daily transactions and provided customer receipts. Starting in the 1970s, POS systems incorporated a host of innovative advancements, such as magnetic stripe readers, computer-driven registers and PC-technology-based retail software.⁶

Payment using cards in lieu of currency began in the 1920s, when merchants such as the General Petroleum Corporation introduced “metal money” that allowed employees and selected consumers to defer

² TSG ETA Economic Indicators Report – 17th Edition.

³ Ibid.

⁴ A “card-present” payment transaction is one in which the physical payment card is present at the point-of-sale.

⁵ “Purchase Transactions at Top US Acquirers,” Nilson Report, Issue 1013, March 2013.

⁶ “Chronological Development of POS Systems”, Alexandria Computers, July 2013.

payment for gasoline and other automobile services.⁷ The first charge card, the Diners Club card, was introduced in the early 1950s as a way for affluent customers to pay for travel and entertainment. The first bank-issued charge card, from Franklin National Bank, followed a year later.⁸ The concept of revolving credit was introduced in 1958 by Bank of America in the form of the BankAmericard program (known currently as Visa).⁹

Debit cards were first used at the POS in the late 1970s at grocery stores such as Angelo's and Star Market, in Massachusetts.¹⁰ Debit card POS acceptance quickly accelerated. The prepaid card was introduced in the 1990s, initially as a closed loop solution offered by retailers for use in their stores, and then as an open loop solution offered through payment brands and banks.

The first contactless payments in the U.S. were introduced in 1997¹¹ in the form of RFID tags used for payment at gas stations. Payment cards using contactless smart card technology were introduced in the U.S. in 2004,¹² providing fast, easy payment for low-value transactions and including new features to help prevent counterfeit card fraud. Contactless mobile payment solution pilots started in 2005¹³ and commercially-available deployment of NFC-based wallets started in 2011. In addition, other mobile payment solutions using a number of technologies have been introduced or piloted.

Most recently, in 2011 and 2012, American Express, Discover, MasterCard, and Visa announced plans to move to an EMV-based payments infrastructure in the U.S.¹⁴

2.2.2 Current Changes

The pace at which POS innovation is occurring has accelerated rapidly. While many developments have contributed to this change of pace, two significant developments are:

- The growth in the use of smart mobile devices.
- The debit industry regulations legislated by the *Dodd-Frank Wall Street Reform and Consumer Protection Act* (the Dodd-Frank Act).

2.2.2.1 Smart Mobile Devices

Increasing smartphone and tablet use has created an environment in which new ideas can be implemented and deployed quickly. With over 130 million smartphones and 60 million tablets in the market today,¹⁵ the audience for these products is large and still growing.

Payment technology advancements made through smartphones and tablets have led to innovations for consumers such as remote ordering then picking up the order at the physical POS and QR code payments at the POS. Merchants can transform a phone or tablet into a mobile POS by simply connecting a card reader. Using a tablet POS, small business owners can perform a number of disparate day-to-day activities using a single device.

⁷ BusinessHive and Creative Commerce Group, "Overview of the Card Industry," 2004.

⁸ Ibid.

⁹ Ibid.

¹⁰ Federal Reserve Board of Kansas City, "A Guide to the ATM and Debit Card Industry," 2003.

¹¹ <http://www.businessweek.com/1997/10/b3517110.htm>.

¹² <http://www.mastercard.com/ca/company/en/35years.html>.

¹³ "Proximity Mobile Payments: Leveraging NFC and the Contactless Financial Payments Infrastructure," Smart Card Alliance white paper, September 2007,

http://www.smartcardalliance.org/resources/lib/Proximity_Mobile_Payments_200709.pdf.

¹⁴ Additional information on EMV migration can be found on the EMV Connection web site, <http://www.emv-connection.com>.

¹⁵ ComScore, "State of the U.S. Online Retail Economy," Oppenheimer 13th Annual Consumer Conference.

While these technology-driven changes are still a small part of the overall payments market, they are altering the way people think about the payment experience. The tablet and smartphone have opened the door for existing suppliers and entrepreneurs to offer new payment solutions at the POS.

2.2.2.2 Debit Industry Regulation

The Federal Reserve Board Regulation II (Debit Card Interchange Fees and Routing)¹⁶, as published in 2011, altered the payments landscape in two clear ways. The Act regulated interchange fees for debit transactions, fundamentally affecting the revenue an issuer would receive for the use of their debit cards at a POS. Merchants would see greater competition for the routing of transactions, by the Act requiring issuers to select a minimum of two unaffiliated networks capable of supporting debit transactions. Each of these changes has affected the payments industry.

For example, one indirect result of Regulation II is that small merchants and other payment innovators became more aware of the expenses related to transaction processing, thus creating an opportunity for entrepreneurs to introduce innovative pricing solutions based on transparency and simplicity.

2.2.3 EMV Migration

An additional development that is currently influencing the payments industry is the impending migration in the U.S. to EMV. The increase in counterfeit cards and fraud led the global financial industry to move to chip technology for bank payment cards and to develop the global EMV specifications. The EMV specifications, first available in 1996 and managed by EMVCo, are global payment industry specifications that describe the requirements for interoperability between chip-based consumer payment applications and acceptance terminals to enable payment.¹⁷ The United States is one of the last countries to migrate to EMV.

American Express, Discover, MasterCard, and Visa have all announced plans to move to an EMV-based payments infrastructure in the U.S. Significant progress has already been made; acquirer processors were required to support merchant acceptance of chip transactions in April 2013, and EMV chip cards are now being issued by many payment card issuers.

In addition, all of the payment brands have announced a U.S. liability shift for domestic and cross-border counterfeit card-present POS transactions, effective October 1, 2015.¹⁸ The payment brands have also used various incentives such as PCI audit and account data compromise relief for merchants on transactions originating from EMV-compliant POS terminals that support both contact and contactless transactions.

EMV migration represents a significant investment for all payments industry stakeholders and is occurring coincident with the deployment of other new payment technologies and models.^{19,20}

¹⁶ <http://www.federalreserve.gov/paymentsystems/regii-about.htm>. Regulation II resulted from the Durbin Amendment to the Dodd Frank Wall Street Reform and Consumer Protection Act.

¹⁷ Source: EMVCo.

¹⁸ This date excludes automatic fuel dispensers, for which the liability shift date is October 2017.

¹⁹ Detailed information on EMV migration for issuers, merchants, acquirer processors, and consumers can be found on the EMV Connection Web site at <http://www.emv-connection.com>.

²⁰ As of October 2013, EMV debit migration is being impacted by the uncertainty of the regulatory environment brought about the federal court ruling on July 31, 2013, which overturned the Federal Board's Regulation II, and the Fed's subsequent appeal on August 21.

3 Payments Innovations

This section reviews a number of innovations for face-to-face POS transactions that are currently being marketed in the U.S. The innovations include both new technologies that are used by consumers and merchants during a payment transaction and new approaches for payments that don't necessarily rely on the traditional card-present transaction model. Innovations discussed in this section include:

- Near Field Communication
- Mobile payment card readers (also known as dongles)
- Tablet POS systems
- Geolocation
- 2-D barcodes
- ACH payment
- Remote ordering

This white paper reviews these innovations, describes their use, advantages and disadvantages, and effect on the traditional payments landscape, and identifies examples of solution providers for each technology or approach.²¹

3.1 Near Field Communication Technology

Near Field Communication (NFC) technology enables devices in close proximity to communicate. The devices must be within a few centimeters of each other and no further than 4 centimeters apart. This makes NFC-enabled devices very suitable for payment transactions that require a high level of security. While NFC is not limited to use in payment applications, use of NFC for payment is what initially drove the introduction of the technology.

NFC payments can be used by network-branded (open loop) and non-network-branded (closed loop) payment card issuers. Examples of appropriate use of NFC for payment include:

- Payment for goods and services at a POS terminal
- Transit fare gate payments
- Parking payments

NFC technology is also being used for non-payment applications, such as tags on advertising posters, coupons, physical access to secure areas, and boarding passes.

3.1.1 NFC in the Payments Environment

Performing a payment transaction with NFC technology requires a contactless POS terminal²² and an NFC-enabled mobile device. The cardholder initiates a transaction by holding the mobile device in close proximity to the terminal.

Financial transactions require an extremely high level of data security. To achieve this level of security, the card credentials and related cryptographic keys used in an NFC payment transaction are typically stored in a *secure element* on the mobile device. The secure element can reside in an embedded secure smart card chip on the handset, on the Subscriber Identity Module (SIM) or Universal Integrated Circuit

²¹ Note: This white paper does not endorse any specific product or service. Product or service references are provided to illustrate the points being made.

²² POS terminals that accept transactions from contactless credit and debit cards can also accept credit and debit payment transactions from an NFC-enabled mobile device.

Card (UICC), or on a secure digital (SD) card that can be inserted into the mobile phone. Recently, NFC applications are being introduced where the card credentials are stored in the cloud and are accessed using proxy credentials on the secure element.

The card credentials are distributed to an *NFC wallet* in the consumer’s mobile device and managed by a third-party trusted service manager (TSM). Using a TSM allows payments providers to participate in the NFC wallet without sharing their customer data.

Consumers who use NFC mobile payments expect to be able to store multiple cards on their mobile devices, just as they store multiple cards in their physical wallets. Multiple card storage is typically implemented using a digital wallet application to which cardholders can add their cards. There are currently two NFC digital wallet applications in the U.S. market: Google Wallet (through Sprint) and Isis® (a joint venture between AT&T Mobility, Verizon Wireless and T-Mobile), described in Table 1.

Table 1. Examples of NFC Digital Wallet Providers in the U.S.

Participating Cards	Where Used	Implementation
Google Wallet		
Any debit, credit, or prepaid card.	Anywhere in the United States where contactless payments are accepted (200,000 locations). ²³	Card credentials are stored in the cloud. A virtual prepaid MasterCard card account is issued and stored on the phone. A consumer purchase is charged to the virtual card providing merchants with card-present rates. Google then charges the consumer card of choice which is stored in the cloud.
Isis Wallet		
Agreement is required between Isis and the issuer.	Anywhere in the United States where contactless payments are accepted.	The credentials are stored on the secure element of the mobile device. The transaction at the POS is between the merchant and the cardholder’s card.

3.1.2 Technology Benefits

Using NFC has major benefits: it is secure and reliable. However, while the number of NFC POS terminals is increasing, the number of locations where NFC is accepted is still limited. This limitation could become less significant as the United States migrates to chip technology and new hybrid contact and contactless POS terminals are deployed.

The wallet on the mobile device benefits consumers by giving them immediate access to multiple payment options and the ability to carry non-payment cards on the same device. NFC wallet technologies create the opportunity for merchants, issuers and wallet providers to drive increased sales and use of their payment tools by delivering targeted marketing such as couponing and special offers.

NFC-enabled mobile devices not only provide consumers with an easy way to pay, they also give consumers access to innovative NFC applications, such as checking-in with a reservation, turning WiFi on and off, activating a timer, or tracking baggage. New uses for NFC are being launched, and this trend will continue as NFC gains a foothold in the market.

²³ Google Commerce, “Use any credit or debit card with the Google Wallet,” August 2012, <http://googlecommerce.blogspot.com/2012/08/use-any-credit-or-debit-card-with.html>.

3.1.3 Impact on the Traditional Payments Landscape

Although mobile payments have increased rapidly around the world, adoption and use of NFC has not yet grown as expected. In a report published in June 2012,²⁴ Gartner Research predicts that in 2013, mobile payments will reach a value of \$235 billion globally, a year over year increase of 44 percent. However, only 2 percent of these transactions will use NFC. Gartner further projects that by 2017, the value of mobile payments will be \$721 billion globally, but NFC payments are expected to account for only 5 percent of this total.

Several reasons have been offered for the slow growth of NFC. The marginal increase in convenience versus magnetic stripe transactions is not sufficient enough to excite consumers. The economics of NFC implementation for the issuing and acquiring communities have been a challenge, resulting in slow adoption of the technology. Merchants also have not been able to make a business case for NFC-based payments alone; the added economic benefits of couponing and loyalty may create a profitable merchant value proposition.²⁵

Other reasons offered for slow NFC adoption include the lack of handsets that can support NFC payment transactions and the lack of contactless payment acceptance. This situation may be changing, however. A recent study by Berg Insight indicates that the global installed base of NFC handsets reached 170 million units in 2012,²⁶ which corresponds to approximately 3.3 percent of all mobile handsets in use. According to this study, the installed base of NFC-enabled handsets is forecast to grow to 2.1 billion by 2017, a compound annual growth rate of 65 percent from 2011.

Technology providers are also addressing the lack of handsets in other ways. For example, NFC stickers, NFC-enabled microSD cards and other NFC-enabled phone accessories are being marketed to equip any mobile phone with NFC capability so that consumers can pay with their mobile phones. In addition, mobile card reader solutions are available that can turn any handset into an NFC-enabled device and allow merchants to accept contactless transactions with the phone.

3.2 Mobile Payment Card Readers

Mobile payment card readers (also known as dongles) are payment acceptance devices that allow a smartphone or tablet to accept a payment card. The technology is enabled through a small device (card reader) that is typically inserted into the headphone jack of a handset or tablet. Mobile card readers are available that support either magnetic stripe cards or EMV chip cards (outside the U.S.).

Mobile card readers were first introduced to the market as a way for merchants with low transaction volumes (e.g., food truck vendors, street performers, artists) to accept card payments.²⁷ As the technology has evolved, technology providers have enlarged their focus to include larger, small and midsize business (SMB) merchants.

²⁴ "Gartner Says Worldwide Mobile Payment Transaction Value to Surpass \$235 Billion in 2013," Gartner press release, June 4, 2013, <http://www.gartner.com/newsroom/id/2504915>.

²⁵ Additional information on NFC mobile payments and ecosystem can be found in the Smart Card Alliance white papers, "The Mobile Payments and NFC Landscape: A U.S. Perspective" and "Proximity Mobile Payments Business Scenarios: Research Report on Stakeholder Perspectives," available at <http://www.smartcardalliance.org/pages/publications-payments-mobile-payments-nfc>.

²⁶ "One in three mobile phones to come with NFC by 2017," NFC World, June 5, 2013, <http://www.nfcworld.com/2013/06/05/324448/one-in-three-mobile-phones-to-come-with-nfc-by-2017/>.

²⁷ According to The Strawhecker Group, there are 25 million merchants in this category in the U.S. market.

3.2.1 Mobile Card Readers in the Payments Environment

The process required to begin accepting payments with a mobile card reader is relatively simple:

1. The merchant opens an account with an acquirer or with a provider that supports a mobile card reader (Table 2).
2. A mobile card reader (often free) is shipped to the merchant.
3. The merchant downloads the provider's application/software to the device.
4. The merchant inserts the mobile card reader into the headphone jack of the appropriate device.

Completing a payment transaction using a mobile card reader is also straightforward:

1. The merchant opens the provider's application on the phone or tablet.
2. The consumer's card is swiped (or inserted) into the mobile card reader.
3. The consumer signs for the transaction or enters a PIN.
4. The consumer selects a receipt delivery option (e.g., print, e-mail, text).
5. The transaction is completed.

Multiple mobile card reader providers are in the market today, with some estimates suggesting that there are over 80 solutions.²⁸ Table 2 lists a selection of the solutions currently on the market. (Provider details were gathered from each company's Web site.)

Table 2. Examples of Mobile Card Reader Providers

Provider	Region Available	Magnetic Stripe/EMV	Card Reader Cost	Transaction Fee Options
Intuit Go Payments	North America	Magnetic stripe	Free	Per transaction fee, or fixed monthly fee and lower per transaction fee
iZettle	Western Europe Latin America	EMV	Free for chip and signature Fee for chip and PIN	Per transaction fee
mPowa	Global	EMV	Fee for chip and PIN	Per transaction fee
PayAnywhere	North America	Magnetic stripe	Free	Per transaction fee
payleven	Western Europe Latin America	EMV	Fee for chip and PIN	Per transaction fee
PayPal Here	North America	Magnetic stripe	Free	Per transaction fee
Square	North America	Magnetic stripe	Free	Per transaction fee or fixed monthly fee
SumUp	Western Europe	EMV	Free	Per transaction fee

²⁸ Javelin, "Mobile POS (Point of Sale) Business and Market Impact," April 2013.

3.2.2 Technology Benefits

Mobile payment card readers are an attractive solution for merchants with a low volume of transactions, who can add a previously unavailable payment acceptance channel. Due to merchant size and mobility, the traditional card payment solution was neither cost effective (due to processing fees or monthly minimum fees) nor practical (due to terminal size) for these merchants. The mobile card reader is typically free; the cost to accept payments is generally a flat per-transaction rate.

For larger SMB merchants, the mobile card reader is attractive as a low cost option for accepting payments.²⁹ Many such merchants are already accepting card payments through a traditional merchant acquirer. However, because SMB merchants are still relatively small, the cost to set up and maintain card acceptance is typically high. It is not uncommon for these merchants to be charged fees for multiple functions, such as terminal leasing, PCI compliance, monthly minimums and annual fees.

In addition, the rates these merchants are charged to complete a card transaction fluctuate based on the transaction classification (e.g., qualified, mid-qualified, or non-qualified).

The mobile card reader pricing structure, with no hidden fees, is attractive to the SMB merchant looking for transparent and consistent pricing. Flat-rate pricing allows merchants to easily forecast the monthly cost of accepting payments.

3.2.3 Impact on the Traditional Payments Landscape

The introduction of mobile payment card readers has led to numerous changes in the traditional payments market. The reader allows merchants with low transaction volumes, who were previously unable to justify the cost of accepting card payments, to start accepting them. This group of merchants represents a new source of revenue for both traditional and new payment processors and acquirers.

Another result is that merchants are now better informed about the costs of card payment. The simple pricing structure associated with the mobile payment card reader has created an environment in which merchants of all sizes are more aware of the fees they pay for accepting card payments. Merchants are increasingly considering all of their options for accepting payments and demanding that payment providers offer transparent pricing options.

The introduction of mobile payment card readers has also resulted in increased competition among merchant acquirers. The introduction of the mobile payment card reader created a new set of competitors in the merchant acquirer space. Initially, these competitors focused on the untapped segment of merchants with low transaction volumes. As they gained traction, however, they began to move up market, into the SMB tiers that historically have been served by traditional acquirers. This new technology, with its simple pricing and setup process, has created an environment in which traditional acquirers must rethink how they service this segment of the market.

3.3 Tablet POS

The tablet POS is a new technology that incorporates the features of traditional merchant POS devices into a tablet solution that is both compact and flexible. A merchant's tablet becomes a multichannel POS system that supports all standard payment services and includes additional value-added services such as employee tracking, inventory management, sales analytics, loyalty, and rewards.

Cloud technology is used to deliver the tablet POS software, allowing providers to add new features and services to their solutions without requiring hardware or software upgrades. When updates are available, a merchant simply downloads the new version of the provider's application to the tablet.

²⁹ Larger SMB merchants should check with their acquirer about their eligibility to use a mobile card reader solution.

Tablet POS systems have been adopted by merchants of all sizes. Large merchants such as Apple and Nordstrom are beginning to roll out custom tablet solutions at many of their retail locations, while smaller merchants have deployed provider-specific solutions. Larger merchants are also using tablet POS systems as “line breakers” during peak periods.

While the use of tablet POS systems within the large merchant base will continue to evolve, many of the tablet POS providers in the market today are building solutions to meet the needs of the SMB merchant (about \$20 million or less in annual sales volume).³⁰ Within the SMB tier, tablet POS systems tend to attract merchants in verticals with high consumer foot traffic and repeat business (e.g., restaurants, quick-service restaurants, retail, and personal services).

3.3.1 Tablet POS in the Payments Environment

The tablet POS system is basically an upgrade of the mobile card reader technology described in Section 3.2. The card reader technology was built to target the needs of the merchant with low transaction volumes. These merchants are typically sole proprietors with basic needs.

Tablet POS targets the larger SMB merchant segment that not only needs to accept payments but also must track staff, inventory, sales trends, and customer loyalty. The sophisticated tablet solutions are built to accommodate these requirements. While the additional services offered differ from provider to provider, the concept is the same: provide a sophisticated and flexible solution that allows a merchant to perform several business functions using one device.

The process for setting up and beginning to use a tablet POS solution is as follows:

1. The merchant purchases a tablet POS solution from a provider. The merchant can also choose additional devices and peripherals, such as cash registers, receipt printers, card readers, PIN pads, and stands, as part of the solution.

Some providers provide the tablet, while others require that the merchant provide the tablet.

2. If the provider is also a merchant acquirer processor, the merchant enters into a transaction processing agreement with the provider (e.g., Square, PayPal, Intuit).

If the provider does not offer processing, it is the merchant’s responsibility to set up a separate merchant processing agreement with a transaction processor (e.g., Leaf, Breadcrumb).

3. The merchant downloads the provider’s application software to the tablet and sets up any additional hardware.

Providers who include the tablet typically preload the application onto the tablet.

The merchant can begin accepting payments using the tablet POS and choose whether to use any integrated value-added services.

Table 3 lists some of the better known solution providers on the market today. The provider details are taken from each company’s Web site.

³⁰ U.S. Small Business Administration definition of SMB.

Table 3. Example POS Tablet Solution Providers

Provider	Tablet POS Hardware Fee	Bring Own Device	Processing Provided	SaaS Fee	Value-Added Services Offered	3rd Party Service Support	Peripherals Supported
GoPago	Free	No	Yes	Monthly fee	Loyalty/rewards Mobile ordering Sales analytics Customized menus Table availability	No	Card reader Stand Barcode scanner Cash drawer Printer Scale
Groupon Breadcrumb	Yes	No	Yes	Monthly fee	Offers Inventory tracking Sales analytics Time tracking Table availability Customized menus	Yes	Card reader Stand Cash drawer Printer
NCR Silver	Yes	Yes	No	Monthly fee	Sales analytics Customized menus	No	Card reader Stand Barcode scanner Cash drawer Printer
PayPal	Yes	Yes	Yes	None	Inventory tracking Sales analytics Time tracking	No	Card reader Stand Barcode scanner Cash drawer Printer
Revel Systems	Yes	Yes	No	Monthly fee	Inventory tracking Sales analytics Time tracking Customized menus	Yes	Card reader Stand Barcode scanner Cash drawer Printer Scales
ShopKeep POS	Yes	Yes	No	Monthly fee	Sales analytics Time tracking Customized menus	Yes	Card reader Stand Barcode scanner Cash drawer Printer
Square Register	Yes	Yes	Yes	None	Inventory tracking Sales analytics Time tracking	No	Card reader Stand Barcode scanner Cash drawer Receipt printer Kitchen printer
Square Stand	Yes						

3.3.2 Technology Benefits

Tablet POS systems offer SMB merchants a number of benefits:

- Simplicity with sophistication
- Reasonable entry costs
- Transparent pricing
- Integration with value-added services
- Mobility

A tablet POS provides merchants with a POS system that requires no complex software upgrades or hardware additions and allows merchants to perform multiple merchant functions from one centralized location. When a new version of the software is available, the merchant simply installs updates from the cloud.

The initial investment in a tablet POS system typically varies from a few hundred dollars to a few thousand dollars, and the system requires little maintenance cost. (Traditional POS systems can cost merchants thousands of dollars and become obsolete after a few years.) In addition, providers have introduced simple pricing models that allow merchants to understand their costs easily.

Providers of tablet POS systems create additional value for the merchant by incorporating other services into the software. The services included vary by provider but typically include functions such as consumer analytics, offers and rewards, employee time tracking, and sales reports. Some providers offer unique value-added services targeted to specific business types (e.g., order tracking for restaurants, inventory management for retail services). Such integrated POS systems allow SMB merchants to manage, track, and maintain their business functions using one piece of hardware at a reasonable price.

Finally, unlike most traditional POS systems, tablet POS systems are mobile. Consider a merchant with a physical brick-and-mortar location who also sells goods at weekly farmers' markets. The tablet POS allows such merchants to take their business with them, without interruption. Tablets also offer mobility within a store. Being able to walk the floor with a tablet allows merchants to assist and check out customers anywhere in the store. According to the 2011 Motorola Solutions Survey,³¹ this mobility will both increase customer satisfaction (no need to wait in long checkout lines) and increase merchant sales (decrease purchase abandonment rates).³²

3.3.3 Impact on the Traditional Payments Landscape

The tablet POS has an impact on the payments landscape similar to the impact of the mobile card reader (Section 3.2). The tablet is a multifunctional, cost-effective payment solution with a simple setup process and transparent pricing.

The tablet POS is forcing traditional acquirers to rethink their competitive activities in the SMB merchant space. The tablet POS provider landscape is currently populated by new entrants, all targeting an important segment of the traditional acquirer's customer base—the SMB merchant. Traditional acquirers must decide whether to offer their own tablet solutions or partner with the tablet POS solution providers.

Like mobile card readers, tablet POS systems have resulted in merchant awareness of payment services and costs. This level of awareness is forcing the payments market to become more transparent in regard

³¹ "2011 Holiday Shopping Survey," Motorola Solutions, http://www.motorolasolutions.com/web/Business/Documents/static%20files/2011_Holiday_Shopping_Survey_North-America.pdf.

³² According to the Motorola Solutions survey, 75% of retail associates reported a better customer experience when using mobile technology. Similarly, the survey report that 67% of shoppers believed that mobile technology leads to a better customer experience.

to pricing. Moreover, merchants are no longer looking for a payment solution only. They are now looking for an integrated solution that allows them to centralize many of their business functions.

3.4 Geolocation Purchasing

Geolocation purchasing is a technology that allows merchants and consumers to complete commercial transactions based on the consumer's presence at the merchant location. Geolocation uses the GPS, WiFi and/or Bluetooth resident on both a consumer's phone and a merchant's tablet POS system (Section 3.3) to identify when the consumer is near or inside the merchant's store.

As an example of geolocation purchasing, when both the merchant and consumer are set up to use geolocation, the consumer can receive special offers from the merchant when the consumer is near the merchant's retail location. The consumer can also complete a transaction without providing a physical card. The merchant's tablet POS system can access the consumer's payment details in the cloud and use those credentials to complete the transaction.

The technology is still in its infancy; only one provider (Square) currently offers a commercial solution to the market (Square Wallet). The solution is marketed to consumers, who download the provider's application, set up an account, and begin using the service at any merchant location that uses the Square Register. Other emerging examples are included in Section 3.8.

3.4.1 Geolocation in the Payments Environment

To illustrate how geolocation is used for payment, the Square Wallet setup process is shown below:

1. A consumer downloads the Square Wallet application to a phone or tablet.
2. The consumer links a payment card and photo to the application.
3. The consumer visits a local business that utilizes Square Register POS technology.
4. The consumer opens the Square Wallet to check in.
5. When placing an order or checking out, the consumer tells the cashier who he or she is.
6. The cashier taps on the consumer's name and photo to confirm the consumer's identity.
7. The transaction is complete.

3.4.2 Technology Benefits

The geolocation solution focuses on ease of doing business and speed as the primary drivers to attract customers. While the concept is interesting, the technology has yet to catch on. Possible reasons for lack of adoption may be:

- Consumers may be unwilling to allow merchants to push notifications to their phones at any time.
- Geolocation services require either that the merchant offer a WiFi connection to which consumers can connect or that the consumer's phone has good data connection service. Inconsistent data services can interfere with the application.
- Speed of payment at the POS may not be a problem that needs a solution.
- The consumer often must pull out the phone and open the application before the merchant system can recognize the consumer's presence. This process is not faster than using a traditional card.

3.4.3 Impact on the Traditional Payments Landscape

This technology currently has no significant impact on the payments landscape. However, as geolocation use grows, the use of the data may be subject to regulatory scrutiny due to the need to protect consumer privacy and data.

3.5 2-D Barcodes

The 2-D (matrix) barcode solution was introduced to leverage growth in the use of smartphones for payment acceptance without requiring NFC-enabled devices or expensive hardware upgrades at the POS. The only hardware requirements are that the consumer has a mobile device able to display or scan a 2-D barcode and the merchant has an optical scanner. 2-D barcodes enable higher-density data storage with better error correction than 1-D barcodes. The QR (quick response) code, Data Matrix, PDF417, and Maxi Code are 2-D barcodes that are currently accepted as international standards.

2-D barcodes can store static data or links to files and Web sites that can then direct a user to coupons, product information, advertisements, registrations, personal or business contact details, product identification, and inventory tracking.

3.5.1 2-D Barcodes in the Payments Environment

2-D barcode solutions currently have two methods of use in the payments environment. The barcode can be presented: 1) on a receipt or on the screen of a payment terminal, or 2) on the consumer's smartphone. The consumer's payment credentials are stored in the cloud (as the source of payment for the first method or as the source for top-up of the prepaid card in the second method).

Method 1. The 2-D barcode is presented on a receipt or on the POS terminal display:

1. A 2-D barcode identifying the transaction is printed on a receipt or displayed on a payment terminal screen.
2. The consumer scans the 2-D barcode using the merchant's or bank's mobile application.
3. The consumer selects a payment method (stored in the cloud) from the mobile application to tie it to the transaction.
4. The payment credentials for the selected method are communicated directly to the merchant's processor to complete payment.

Method 2. The 2-D barcode is displayed on the phone:

1. The consumer purchases or adds value to the merchant's virtual prepaid card from the mobile application.
2. The consumer checks out at the merchant's POS.
3. The consumer displays the 2-D barcode representing the virtual prepaid card or tokenized credentials using the mobile application.
4. The merchant's POS scanner scans the 2-D barcode and handles it like a physical prepaid card or tokenized card.³³

Because this payment solution relies on either cloud credentials entered by the consumer or virtual closed-loop prepaid cards, it is considered to be more appropriate for use by merchant brands than by card payment networks.

Table 4 lists providers who currently offer 2-D barcode scanning solutions.

³³ In the case of the LevelUp solution, the 2-D barcode represents the consumer's LevelUp account; the consumer's default payment credentials, stored in the LevelUp cloud, go directly to the merchant's processor.

Table 4. Examples of Providers Offering 2-D Barcode Scanning Solutions

Provider	2-D Barcode Presentation	Notes
Dunkin' Donuts	Smartphone	A smartphone is not required when the barcode is gifted. The barcode can be printed and brought into a store to be scanned.
LevelUp	Smartphone	Merchant-brandable solution — also provides the merchant with different options for the scanning terminal.
Paydiant	Receipt or payment terminal	Used at restaurants/bars and banks. Customers must buy something to access the 2-D barcode.
Starbucks	Smartphone	–

3.5.2 Technology Benefits

For merchants, there are two primary advantages to the 2-D barcode solution: expensive POS hardware upgrades are unnecessary, and the solution does not require consumers to have NFC-enabled smartphones. In addition, if the mobile app always defaults to the merchant's own closed-loop card as the preferred payment method, this solution gives merchants better control of fees (for a stored prepaid card, interchange fees are only charged when value is added to the card). Moreover, merchants can use the mobile application to create more direct relationships with their customers by collecting their buying habits.

This solution allows consumers to avoid fumbling for cash, cards or coupons, gives them real-time feedback, and provides them with the ability to redeem loyalty points into coupons or credits. If consumers are using virtual prepaid cards, they can receive balances in real time and potentially opt-in to top up their cards automatically at a certain threshold or be notified of low balances automatically by using the mobile application.

Both consumers and merchants can benefit from more precisely targeted offers and strengthened merchant loyalty.

3.6 ACH at the POS

The Automated Clearing House (ACH) system was launched in 1974 as a batch processing system for transferring direct payroll deposits and government payments between trusted parties. The original intent was to provide a convenient and efficient alternative to paper checks. The system has evolved to include millions of consumers, who use it to make bill payments over the Internet and person-to-person (P2P) payments.³⁴ It has also been adopted as the backbone settlement network for multiple alternative payment systems.³⁵ The Federal Reserve Banks are the largest ACH operator, accounting for approximately 60 percent of interbank ACH transactions. The private-sector Electronic Payments Network (EPN) processes the remaining 40 percent.³⁶

In 2012, the number of ACH transactions totaled 21 billion, up more than 4 percent over 2011. A total of \$46.9 trillion was transferred in 2012, an increase of nearly 9 percent over 2011.³⁷ The National ACH

³⁴ Digital Transactions, June 2013, <http://digitaltransactions.net/issues/viewer/4128>.

³⁵ Automated Clearing House, <http://www.ach.com/What-is-ACH.aspx>.

³⁶ Wikipedia, http://en.wikipedia.org/wiki/Automated_Clearing_House.

³⁷ NACHA, the Electronic Payments Association, April 9, 2013, https://www.nacha.org/node/1356?utm_source=NewsFilter+349+4%2F12%2F13&utm_campaign=NF+%23349+4%2F12%2F13&utm_medium=email.

Association (NACHA), which develops the rules and standards for ACH transactions, attributes this growth to increased numbers of electronic and online payments.

NACHA is actively pursuing approaches that capture person-to-person (P2P) transactions. A P2P payment proposal approved in March 2013 outlines a credit version of Internet bill payment that allows an originator to initiate a funds transfer to the receiver (i.e., “push” funds). This innovation is expected to increase the ACH share of P2P payments to \$120 billion in 2017.³⁸

ACH is being used as an alternative for traditional POS payments due to its lower transaction fees (typically less than 10 cents per transaction). Some larger merchants, such as Target, Shell, and Nordstrom, are also leveraging loyalty cards linked to ACH payments as a way to promote their brand.

3.6.1 ACH in the Payments Environment

Unlike card systems, most ACH transactions are initiated by the payee or receiver of funds (i.e., “pull” transactions). The consumer would authorize a merchant to issue an ACH debit to the consumer’s account. Once authorization is received, the merchant creates an ACH entry for transmission to a bank offering ACH origination services. The ACH entry is sent to one of the two ACH operators – the Federal Reserve or EPN – and routed to the consumer’s bank, where the account is debited. ACH currently operates in batch overnight mode, although creation of a real-time or intra-day service has been proposed.

ACH has developed two methods for completing transactions at the physical POS: POS entry and point-of-purchase (POP) entry.

POS entry is initiated by a consumer using a debit card and PIN. The consumer signs an authorization form permitting the merchant to debit the account for ACH transactions originated by the debit card. The debit card is swiped through the POS terminal, capturing account information from the magnetic stripe. Authorization of available funds goes through the ATM network. The merchant sends the transaction through the merchant’s bank or processor, which routes the transaction to the Federal Reserve. The Federal Reserve debits the consumer’s bank account and credits the merchant’s bank account.

POP entry is initiated when the consumer writes and signs a paper check. The check is read by the merchant POS terminal, captures the purchase amount and the routing, account, and check numbers, and generates a debit transaction. The voided check is then returned to the consumer.

3.6.2 Technology Benefits

The primary advantage of ACH at the POS for merchants is the generally lower transaction fee as compared to credit or debit card transaction fees. Merchants may have to pay additional fees for fraud or guaranteed fund protection, but these fees are typically lower than traditional card fees.

There are some challenges with using ACH:

- ACH is a batch system; it is not designed to handle real-time payments. Payments are not committed until the end of the business cycle.
- Merchants accept the liability for a situation in which a transaction may not clear due to lack of funds in the consumer account.
- The system offers only limited fraud or chargeback protection for consumers. The *Truth in Lending Act* limits consumer liability on credit cards to \$50. Both debit cards and ACH are governed by Reg E, which has a tiered liability structure that depends on when consumers notify their bank of an unauthorized transaction. Liability can be unlimited if the consumer delays for 60 days.

³⁸ Digital Transactions, April 23, 2013, <http://digitaltransactions.net/news/story/3955>.

- Unauthorized ACH transactions result in funds “missing” from the consumer’s account until a provisional credit is issued. The consumer may not be aware of the missing funds, resulting in insufficient funds and associated bank fees.

3.6.3 Impact on the Traditional Payments Landscape

Enterprises leveraging ACH at the POS as a way to save on transaction fees have met with mixed success. Challenges with implementing ACH at the POS have been immature technology and failure to achieve merchant adoption. Table 5 lists merchants who have successfully implemented the use of ACH at the POS and examples of service providers offering ACH-based payment to merchants.

Table 5. Examples of Merchants and Service Providers – ACH at the POS

Company	Program Description
Various retailers, including Target, Shell, and Nordstrom	Loyalty cards with different perks: Target Redcard debit card offers a 5% discount. Shell Saver card offers 2¢ off each gallon of gas. Nordstrom card offers rewards points and extra services.
Dwolla ³⁹	Emphasis is on payments to Facebook or Twitter connections. Instantaneous money transfer system (FiSync is a real-time alternative to ACH developed by Dwolla).
PayPal	Expanding to physical POS from its traditional P2P, e-commerce, and eBay market. Most accounts are linked to credit cards, but PayPal encourages users to use ACH.

In addition, the Merchant Customer Exchange (MCX) is a mobile payments scheme being developed by some of the largest U.S. merchants. MCX is widely rumored to be leveraging ACH to reduce merchant transaction fees.⁴⁰

3.7 Remote Ordering

Remote ordering allows consumers to use a merchant’s or provider’s mobile application, mobile Web site, or traditional Web site to place and pay for orders. The goods ordered are then picked up by the consumer shortly after completion of the order.

The technology is most commonly used by merchants in the quick service restaurant (QSR) vertical. It is also used by casual dining restaurants and some service-oriented businesses, such as florist shops and tanning salons.

3.7.1 Remote Ordering in the Payments Environment

Merchants must work with a technology provider to set up remote ordering. How the technology is integrated depends on which provider is used. The two possible solutions are merchant-branded and provider-branded. In a merchant-branded solution, providers incorporate their technology into a merchant’s application or Web or mobile site. Merchants then use their brand to promote the service to

³⁹ [http://qz.com/7848/heres-the-evidence-that-dwolla-square-the-two-hottest-us-startups-in-payments-are-going-to-get-together-to-defeat-visa-mastercard/.](http://qz.com/7848/heres-the-evidence-that-dwolla-square-the-two-hottest-us-startups-in-payments-are-going-to-get-together-to-defeat-visa-mastercard/)

⁴⁰ [http://bankingblog.celent.com/2013/02/is-mcx-betting-on-qr-codes-and-ach/.](http://bankingblog.celent.com/2013/02/is-mcx-betting-on-qr-codes-and-ach/)

their customers. In provider-branded solutions, the provider's branded application or Web or mobile site is used for ordering. The merchant is simply added to the provider's merchant directory. The merchant then promotes the provider's ordering service to consumers.

While providers can integrate their own features into the process consumers use to order, the basic process is as follows:

1. Select the merchant (in most cases, a restaurant) and connect to the ordering tool.

Depending on who is providing the technology, this can be accomplished in different ways:

- Download the provider's application to the phone, and then browse the merchants listed to find the desired merchant.
- Download a merchant-specific application to place the order directly using the application.
- Connect to a merchant's Web site or mobile URL to place the order.

2. Browse the merchant's product list or menu and select items to order.
3. Add any preferences.

Most ordering services provide the ability to add preferences to food orders, such as condiments or specific cooking instructions.

4. Before completing an order, specify when the order should be ready for pick up.

Merchants that offer delivery services may also allow consumers to select a delivery time.

5. Enter payment credentials.

For first-time buyers, the checkout process is similar to a typical e-commerce experience. The consumer is prompted to enter payment card information and an address. Most services provide an option for storing payment information for future orders.

6. Note the confirmation number required for pickup, provided by the application (either online or in an e-mail message or both).
7. Pick up the order.

Many merchants have a location that is dedicated to picking up mobile orders, allowing consumers to quickly pick up their order without waiting in line. To pick up an order, the consumer must provide the confirmation number.

Some providers or merchants offer unique remote ordering features. These features include:

- Rewards or loyalty. Most services incorporate a rewards feature that is either specific to the merchant or used by all merchants associated with the technology provider.
- QR code advertising. Merchants can place QR codes on advertisements. When the consumer scans the code, a remote ordering site or application is displayed.
- Order pickup windows. Some merchants designate a specific window where consumers can pick up orders. The window may be inside, outside, or in a drive through.

Table 6 shows examples of remote ordering service providers. The provider details are taken from each company's Web site.

Table 6. Examples of Providers Offering Remote Ordering

Provider	Service Options	Consumer Ordering Options	Unique Features
GoMobo	Merchant branded	Web URL Mobile URL Mobile application	Reporting engine Suggestive selling Save customer favorite orders
GoPago	Provider branded	Mobile application	Integrated tablet POS solution
GrubHub	Provider branded	Web URL Mobile URL Mobile application	Consumer loyalty campaigns
ONOSYS	Merchant branded	Web URL Mobile URL Mobile application	Intelligent upselling Loyalty program Performance dashboard
orderTalk	Merchant branded	Web URL Mobile URL Mobile application	Gift card integration Customized reporting services Group ordering solutions Customized domain names
PayPal	Provider branded	Mobile application	Restaurant ordering Integration with coupons and offers Integration with POS payment service
Snapfinger	Merchant branded Provider branded	Web URL Mobile application	–

3.7.2 Technology Benefits

Remote ordering is attractive to merchants for several reasons.

First, remote ordering expands the merchant’s reach, providing merchants with an additional method of taking customer orders. A merchant can service more customers without expanding the merchant’s physical location.

Remote ordering also increases productivity. A remote ordering service allows a merchant’s staff to spend more time focusing on filling orders. Employees no longer need to be on the phone taking orders from customers; customers send in their orders and preferences themselves, freeing more staff to prepare orders based on these instructions.

Finally, remote ordering can result in increased customer satisfaction. Offering a new ordering service that allows customers to complete their own orders without having to interact with an employee is attractive to certain consumers and can strengthen customer loyalty.

Remote ordering also has advantages for the customer. Customers can order at their own convenience, browsing a menu, placing an order, and adding preferences without speaking with an employee. This is attractive to many customers, who would rather take their time and order at their own convenience. In addition, by incorporating a pickup or delivery time for the order, customers can place orders so that the orders are ready when the customers need them. And to customers on the go, being able to order in advance and pick an order up without standing in line is very attractive.

3.7.3 Impact on the Traditional Payments Landscape

The increased use of remote mobile ordering (especially in the QSR and casual dining verticals) may affect the traditional payments landscape in several areas:

- Transaction pricing
- Merchant expectations
- Consumer expectations

The payment transaction for a remote order purchase is currently considered a card-not-present⁴¹ transaction. However, when the order is fulfilled, the cardholder is present, which is more like a traditional card-present transaction. As the use of remote ordering increases, merchants may put more pressure on both the payment brands and the payment acquirers/processors to revisit how these transactions are classified.

Like many other current innovations in payments, remote ordering provides services to the merchant beyond being able to take a payment. Merchants today expect their payment providers to offer value-added solutions that allow the merchants to use mobile technology to interact with consumers in ways that were previously not possible. As services like this become increasingly popular, merchants will place more pressure on the payment providers (e.g., acquirers, processors, payment brands) to incorporate value-added services into their offerings.

Just as merchants place pressure on their payment providers, so will consumers place pressure on merchants. Remote ordering is a convenient service for consumers. It is not too difficult to imagine that a consumer would select one location over another because it offers remote ordering.

3.8 Other Payments Innovations

In addition to the payments technologies and approaches discussed in this section, other payments innovations continue to be introduced into the market. Other innovations worth noting are the following.

- **Bluetooth-enabled mobile payments.** Bluetooth Low Energy⁴² (BLE) also known as Bluetooth Smart is a 2.4 GHz wireless technology, consumes low power, operates up to 100 meters in range, and is primarily used for data transfer. Recently PayPal has announced that it will be offering a hands-free, cashless and card-free mobile payment solution called Beacon⁴³ using BLE technology. According to PayPal, this solution will offer convenience for consumers to shop hands-free by playing a sound on their phones and for merchants to recognize consumers as they enter store in order to provide them offers and allow them to make payments.
- **Magnetic induction technology.** A new way of making payments using mobile phones called Magnetic Secure Transmission⁴⁴ (MST) has been developed by a company called LoopPay; this technology will enable consumers to perform payment transactions by placing phones on the traditional POS terminals that accept magnetic stripe cards. Phones require a consumer accessory along with the wallet app to make payments.
- **Google Host Card Emulation support.**⁴⁵ Google added platform support for Host Card Emulation (HCE) in Android 4.4. When HCE is implemented on a mobile device, any app can emulate a contactless smart card, communicate with the NFC controller and allow users to initiate transactions with a contactless POS terminal. Using HCE, NFC applications would not need to

⁴¹ A “card-not-present” payment transaction is one in which the physical payment card is not present – for example, for an order at an Internet merchant or for a telephone order.

⁴² <http://www.bluetooth.com/Pages/low-energy-tech-info.aspx>.

⁴³ <https://www.paypal.com/webapps/mpp/beacon>.

⁴⁴ <http://www.looppay.com/wordpress/theloop/>.

⁴⁵ <https://developer.android.com/guide/topics/connectivity/nfc/hce.html>.

use the secure element in transactions; the NFC application could initiate and conduct transactions directly and store and access credentials anywhere (e.g., in the cloud or in application memory).

Payments innovation is progressing at a rapid pace with new mobile device functionality fueling innovative approaches. While this white paper has attempted to cover the significant innovations being deployed in the market in 2013, payments industry stakeholders need to continue to review new payments innovations to assess their impact on merchants and consumers and develop strategies to take advantage of new technologies and approaches.

4 Key Questions and Considerations

Merchants who are considering whether to adopt any of the current innovations in the U.S. payments industry must consider several matters in addition to the usefulness of the innovation. Payment innovations, advances in data storage, and improved information processing capabilities have resulted in more and more data being shared and stored during everyday transactions, raising issues of consumer privacy and data security. Merchants must also be aware of how the new innovations may impact or be impacted by EMV, whether transactions are considered card-present or card-not-present transactions, and how the innovation impacts the POS process.

4.1 Consumer Privacy

Proper management of consumer data is critical. Any compromise to this information can have results ranging from unapproved customer behavior tracking to identity theft.

While data aggregation can be used for marketing purposes, any potential use of the data acquired through adoption of a payment innovation should be disclosed in advance, and the consumer should be able to control how the private information is used. It is important to consider that the storage and use of personal data is subject to regulation, and the party implementing the technology is responsible for complying with all relevant rules.

The following key questions should be considered when implementing new payment innovations:

- Is any personal information transferred, stored, or aggregated during a transaction?
If the implementation of a new payment technology involves additional consumer or transaction data, all parties need to ensure that this information is managed securely.
- Are customers informed of all potential uses of transaction information?
Consumers must be informed of any planned use of collected transaction information, even if data is aggregated. The relevant parties must also follow and comply with all privacy regulations.
- Can consumers opt in or out of the use of personal information for marketing purposes?
Before a party can make any use of information acquired during a transaction, consumers must explicitly acknowledge the collection and use of their personal data.

Tokenization at the POS may address some of the privacy concerns for new payments innovations.

Table 7 summarizes the consumer privacy impact for the payment innovations described in Section 3.

Table 7. Payment Innovations and Consumer Privacy

Innovation	Consumer Privacy Impact
NFC technology	No additional consumer privacy impact; however, NFC-enabled devices potentially provide access to complementary applications that need to be considered as part of the NFC ecosystem. Wallet providers can track NFC usage, which can then be used to drive targeted marketing, couponing, and offers. All parties active in the NFC ecosystem are required to comply with all regulations regarding data privacy.
Mobile card readers (dongles)	No impact.
Tablet POS devices	No impact.

Innovation	Consumer Privacy Impact
Geolocation	Consumers may be unwilling to allow merchants to track their location. The way the data is stored and used should be disclosed to consumers. Any geolocation data used to track behavior should comply with all applicable regulations.
2-D barcodes	Either the merchant or the mobile application developer can consult with the consumer to determine what data can be used, with the understanding that the receipt of information about consumer purchasing behavior enables merchants to better target their customer offers.
ACH	No impact.
Remote ordering	Merchants and providers must disclose how they use customer data. All marketing efforts should allow consumers to opt-in or out.

4.2 Security

New payment innovations have significant implications for data security. While the encryption capabilities in most devices can support significant improvements over the security offered in traditional transactions, connected devices also open the door to network attacks and malware.

As is true for traditional payment ecosystems, new payment innovations must consider how identity is validated and how the transaction is authenticated and approved. However, the evolving nature of payment innovations can create gaps in security compliance as regulations catch up with innovation.

The following key questions should be considered when implementing new payment innovations:

- What levels of PCI compliance are required, and what regulations need to be followed?
PCI compliance may now apply to multiple devices, internal and external networks, and information stored in-house. Merchants will have to keep up-to-date on compliance as they adopt new technologies.
- What are the security implications for the merchant, and what are the security changes for consumers?
Merchants must understand the impact of security perception: will a technology that is perceived as less secure affect consumer behavior?

Tokenization at the POS may address some of the security concerns for new payments innovations.

Table 8 summarizes the security impact for the payments innovations described in Section 3.

Table 8. Payment Innovations and Security

Innovation	Security Impact
NFC technology	There could be a perception, regardless of reality, that NFC contactless technology is less secure than magnetic stripe technology and that cardholder data could be easier to skim. Device-specific security (wallet plus device passwords) make NFC technology more secure than a standard physical wallet. Contactless credit and debit payment transactions using NFC-enabled devices also provide additional security by generating a dynamic value for each transaction.
Mobile card readers (dongles)	Potential impact on PCI compliance, depending on the device.

Innovation	Security Impact
Tablet POS devices	No impact as long as the merchant applies the same guidelines applied to traditional POS devices.
Geolocation	Potential for consumer concern with what someone might be able to do if they obtain their phone or if there is a merchant data breach
2-D barcodes	Standard 2-D barcodes can be decrypted and copied; they should not include any personal identification information. The risk of 2-D barcodes can be mitigated. One option is to use a time-limited dataset within the barcode, requiring the mobile device to have a loop-back to a cloud backend that manages the rolling barcode. The supporting mobile application should build PIN or password protection into the app or the payment steps and not store the payment credentials on the mobile device. Any PCI compliance requirements within the mobile application and its supporting infrastructure (backend servers) should be managed accordingly.
ACH	As a best practice, merchants should protect consumer account information.
Remote ordering	Issues are similar to those raised by e-commerce transactions.

4.3 EMV Migration

One additional factor in determining whether to adopt new payment technology is the effect of EMV migration. The payments community should consider how the migration impacts new technology adoption and plan implementation to ensure that new infrastructure investment can support both EMV and other technologies that deliver value. Doing so minimizes fraud exposure after the liability shift, ensures that all U.S. and foreign customers are able to perform transactions using their cards and mobile devices, and reaps the benefits of various incentives offered by the payment brands.

Two key EMV migration questions should be considered when implementing payment innovations:

- Is the merchant acceptance device EMV-compliant?
- Is the consumer presenting payment credentials that use EMV technology?

To serve consumers who present an EMV chip card at the POS, the payment acceptance device must support EMV, to both minimize fraud exposure after the EMV liability shift and take advantage of payment brand incentives. This requirement affects mobile card readers, tablet POS devices, and contactless POS terminals that accept NFC transactions; these POS devices would have to be upgraded to support EMV.

Many of the payment innovations remove a payment card from the physical transaction; they rely either on payment account information stored in the cloud (geolocation, 2-D barcodes, remote ordering) or alternate payment mechanisms (ACH). If the payment account information is stored in the cloud, the transaction may be considered card-not-present, which could impact transaction fees and liability policies. Card-not-present transactions are not affected by the EMV liability shift.

NFC-based payment services can support EMV transactions by using an EMV payment application on the mobile device, storing the cardholder account information in an EMV-compliant secure element, and presenting the account information to an EMV-compliant contactless POS terminal. This would be considered a card-present transaction. Since current NFC-based payment services are based on the magnetic stripe infrastructure, they will need to be upgraded to support EMV.

Table 9 summarizes the impact of EMV migration for the payments innovations described in Section 3.

Table 9. Payment Innovations and EMV Migration

Innovation	EMV Migration Impact
NFC technology	<p>EMV transactions can be supported on mobile devices with NFC technology by using an EMV payment application on the mobile device, storing the cardholder account information in an EMV-compliant secure element, and presenting the account information to an EMV-compliant contactless POS terminal.</p> <p>Current NFC-based payment implementations are based on magnetic stripe transactions and will have to migrate to EMV technology.</p> <p>Current contactless POS terminals will have to migrate to EMV. The timing of a merchant's implementation could result in a period of time when merchants using current POS contactless terminals are responsible for fraudulent transactions.</p>
Mobile card readers (dongles)	<p>Most (if not all) of the current solutions in the U.S. support magnetic stripe cards only; both the reader hardware and software will have to migrate to accept EMV chip cards.</p> <p>Increases in provider costs for chip readers could lead to modified pricing strategies.</p> <p>The timing of a merchant's implementation could result in a period of time when merchants using mobile card readers that are not EMV-compliant are responsible for fraudulent transactions.</p>
Tablet POS devices	<p>Most (if not all) of the current solutions in the U.S. support magnetic stripe cards only; both the reader hardware and software will have to migrate to accept EMV chip cards.</p> <p>Increases in provider costs for chip readers could lead to modified pricing strategies.</p> <p>The timing of a merchant's implementation could result in a period of time when merchants using mobile card readers that are not EMV-compliant are responsible for fraudulent transactions.</p>
Geolocation	<p>No EMV impact.</p> <p>Because account information is stored in the cloud and no card is presented at the POS, these transactions are considered card-not-present transactions, incur card-not-present interchange rates, and follow current card-not-present liability policies. Card-not-present transactions are not affected by the EMV liability shift.</p>
2-D barcodes	<p>No EMV impact.</p> <p>Because account information is stored in the cloud and no card is presented at the POS, these transactions are considered card-not-present transactions, incur card-not-present interchange rates, and follow current card-not-present liability policies. Card-not-present transactions are not affected by the EMV liability shift.</p>
ACH	<p>No EMV impact.</p>
Remote ordering	<p>No EMV impact.</p> <p>Since the payment transaction takes place on an e-commerce site, these transactions are considered card-not-present transactions, incur card-not-present interchange rates, and follow current card-not-present liability policies. Card-not-present transactions are not affected by the EMV liability shift.</p>

4.4 Payment Innovations and Card-Not-Present Transactions

While some potential solutions have been deployed to address card-not-present fraud (e.g., PIN and token devices, 3-D Secure), none of them are widely accepted in the industry. An important step within the payment process has always been properly authenticating the consumer and matching the consumer to the payment device being presented to complete the purchase. This is true for both card-present and card-not-present transactions. In a card-present environment, because the consumer is physically present, the risk associated with that transaction has been relatively low. In typical card-not-present

transactions, the cardholder is not physically present when the transaction is made, and it is therefore more difficult for the merchant to verify the cardholder is the authorized user of the card. This increased risk is one of the main reasons that it is more expensive for merchants to accept card-not-present transactions.

The innovative payments technologies covered in this white paper are used at a physical POS; however, with many of them, the fees charged for the transaction is a card-not-present rate. For example, when a consumer uses a barcode application, such as LevelUp, the transaction is considered a card-not-present transaction because the consumer’s card that has been linked to the barcode was not physically used to complete the transaction. Another example is a remote ordering solution. The consumer’s card data used to complete the transaction is stored in the merchant’s or provider’s system and is not physically present to complete the purchase.

While it is still too early to know which innovative solutions will achieve widespread adoption, it is clear that many of these solutions blur the line between the current definitions of card-present and card-not-present transactions. The industry may ultimately have to reconsider the payment network acceptance, operating rules and transaction fees associated with these transactions.

4.5 Merchant Considerations

There are many factors a merchant must consider before adopting any of the innovative payment solutions covered in this paper. These considerations include factors such as: how willing consumers will be to use the technology; whether the solution needs strong data connection services for consumers; whether there will be disruptions in the service; whether the solution can be integrated with the current POS device/software; what the costs associated with using the solution are.

The table below compiles a list of factors that merchants should consider for each of the innovation solutions discussed in this paper.

Table 10. Payment Innovations and Merchant Impact

Innovation	Merchant Considerations
NFC technology	Requires merchants invest in POS devices that support contactless payments. Merchants should consider consumer use of the technology. Do your customers have NFC capable smartphones? Do they see or has the merchant created a value proposition that would encourage customers to use the solution?
Mobile card readers (dongles)	If not currently accepting cards today, will card acceptance expand your business? How reliable is the mobile card reader you are investing in? Do you have an existing POS system that you would like the mobile card reader to be integrated with? What per-transaction acceptance rates will be charged? How quickly will funds be deposited into your account? What level of customer support does the provider offer? Are there any security concerns with the provider or service that you should consider?
Tablet POS devices	If you plan to integrate the tablet solution with your current POS system, how easily can that be done? What is the cost to purchase the tablet solution? Are there recurring fees? Does the solution support multiple devices? Are there other integrated services/tools (e.g., loyalty, inventory management, order tracking, reporting) that are included? Do you need to provide your own tablet device or is that included in the basic package? What peripherals does the tablet solution support and come with? If these peripherals aren’t included in the basic package, what are the additional costs to include them?

Innovation	Merchant Considerations
	<p>Does the tablet solution support consumer PINs? Can you use your existing merchant acquirer/payment processor? What level of customer support does the provider offer? Are there any security concerns with the provider or service that you should consider? How quickly will funds be deposited into your account?</p>
Geolocation	<p>Can the solution be integrated into your current POS system? Does it require a new intermediary to process transactions? How reliable is the service? Are consumers using the solution and will this add value to your customer base? What are the costs associated with using the service? What level of customer support does the provider offer? Are there any hardware requirements you need to be aware of? How are chargebacks and returns processed? Does the merchant location have strong data connection services or WiFi for consumers to connect to? If mobile phone data connectivity is a problem within a merchant's location, this may frustrate consumers attempting use.</p>
2-D barcodes	<p>How do you integrate the service with your current POS system? Does it require a new intermediary to process transactions? Do your consumers have the necessary smartphones required to use the solution and are you delivering value to the customer that will encourage them to use the payment service? What are the fees associated with accepting payments through the provider's service? Are there any service disruptions you should be aware of? Are there any hardware requirements? What level of customer support does the provider offer? Can you use your existing merchant acquirer/payment processor? How are chargebacks and returns processed?</p>
ACH	<p>Can the solution be integrated into your current POS system? Does it require a new intermediary to process transactions? How reliable is the service? Are consumers using the solution and will this add value to your customer base? What are the costs associated with using the service? What level of customer support does the provider offer? Are there any hardware requirements you need to be aware of? How are chargebacks and returns processed?</p>
Remote ordering	<p>Can the solution be integrated into your current POS system? Does it require a new intermediary to process transactions? How does the order process work and does it fit with how you currently operate your business? What consumer-facing tool do your customers use and how do they find your business? Is the service branded under your business or are you part of a merchant directory under the provider's brand? What are the fees associated with the service? How reliable is the service? What level of customer support does the provider offer? Are there other features included in the service (e.g., reporting, loyalty)? How are chargebacks and returns processed?</p>

5 Conclusions

In recent years, the payments industry has delivered a number of point-of-sale payment innovations driven by mobile technology and an accelerated pace of change. These innovations include solutions that utilize smartphones and tablets to mobilize payments acceptance. Rather than swipe a card, payment options that employ technologies such as contactless and QR code reading are being adopted in the market. The vast majority of recent point-of-sale innovation has focused on convenience for the merchant and consumer. For merchants, these solutions offer increased flexibility and system integration while at the same time introducing simplistic and transparent pricing. For the connected consumer these innovations promise the ability to deliver added value through real-time offers, loyalty and remote ordering solutions.

These new technologies come as the U.S. payments industry embarks on a shift from magnetic stripe-based cards to the more secure EMV chip-based technology used throughout the globe. As innovators continue to deliver new solutions, they will need to consider how those solutions function in a chip card-based market.

While mobile technology delivers solutions for an “always connected” society, privacy and security concerns must not be ignored. Although many consumers desire the payment flexibility and convenience that a smartphone can offer, they also want the control to turn those features on and off at their discretion. For merchants, while payment flexibility and integration are attractive, they require solutions to be secure and not compromise data or increase their fraud liability. To reach mainstream adoption, innovators will need to ensure their solutions not only deliver value but also provide secure solutions that don’t compromise privacy.

As payment innovations continue to leverage mobile technology, the lines between what is considered a card-present transaction and a card-not-present transaction are becoming increasingly blurred. Although all of the solutions discussed in this paper are solutions for the physical point-of sale, many of them are charged to merchants at card-not-present acceptance rates because a physical payment card was not used to complete the transactions. As adoption of these solutions increases, the industry might very well need to reconsider how it defines a card-not-present transaction.

While these technology-driven changes are still a small part of the overall payments market, they are altering the way people think about the payment experience. The payments innovations have opened the door for existing suppliers and entrepreneurs to offer alternative payment solutions at the POS.

It is still too early to tell how the landscape of the payments industry might be impacted by the wave of new technology that is reaching the market. In the end, those that can integrate added value, flexibility and speed to all parties along the payment value chain, without impacting security or privacy, might ultimately have the best chance of success.

6 Publication Acknowledgements

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Publication of this document by the Smart Card Alliance does not imply the endorsement of any of the member organizations of the Alliance.

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The Smart Card Alliance Payments Council focuses on facilitating the adoption of chip-enabled payments and payment applications in the U.S. through education programs for consumers, merchants, issuers, acquirers/processors, government regulators, mobile telecommunications providers and payments service providers. The group is bringing together payments industry stakeholders, including payments industry

leaders, merchants and suppliers, and is working on projects related to implementing EMV, contactless payments, NFC-enabled payments and applications, mobile payments, and chip-enabled e-commerce. The Council's primary goal is to inform and educate the market about the value of chip-enabled payments in improving the security of the payments infrastructure and in enhancing the value of payments and payment-related applications for industry stakeholders. Council participation is open to any Smart Card Alliance member who wishes to contribute to the Council projects.