# Mobile Phone: The New Way to Pay?

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O ver the past decade, the introduction of new technologies has transformed the payment industry and consumers' payment/purchase behavior. Alongside shifts in payment channels, payment instruments are also changing. Prior to the Internet boom in the late 1990s, consumers typically made purchases in stores or via mail- and phone-order catalogues. Currently, approximately 67 percent of the 147 million adult Americans using the Internet make some purchases online.[1] In stores, cash and checks are increasingly being replaced by electronic payment methods, particularly credit cards and debit cards. *The 2004 Federal Reserve Payments Study* asserted that electronic payments, for the first time ever, surpassed paper checks in the number of total transactions.[2]

So, what's next? Industry experts cite mobile payments—the exchange of financial value between two parties using a mobile device [e.g., mobile phone or personal digital assistant (PDA)]—as the wave of the future. With approximately 230 million mobile subscribers in the United States (over 70 percent of the U.S. population), mobile payments are on the horizon of the payment industry.[3]

Advancements in technology have already begun to extend the use of mobile devices beyond the scope of day-to-day communications. Consumers now simultaneously use relatively inexpensive mobile phones as digital cameras, personal audio players, date books, games, calculators, and clocks. Users additionally perform other functions like text messaging. In June 2006, users sent 12.5 billion text messages, up 71 percent from 7.3 billion text messages in June 2005.[4]

> **Highlights:**
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> *The first in a series on mobile payments, this briefing will examine:*
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> - The disparities in mobile payment technology: remote versus proximity
> - The barriers to adoption of mobile payments and the complexity of the value chain
> - Considerations in consumer acceptance and mass adoption of this emerging payments technology.

The views expressed in this paper are those of the author and do not necessarily reflect those of the Federal Reserve Bank of Boston or the Federal Reserve System.

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[1] PEW. *Internet Activities*. July 19, 2006 <http://www.pewinternet.org/trends/Internet_Activities_7.19.06.htm>

[2] The Federal Reserve Board. *The 2004 Federal Reserve Payments Study: Analysis of Noncash Payments Trends in the United States: 2000-2003*. <http://www.frbservices.org/Retail/pdf/2004PaymentResearchReport.pdf>

[3] CTIA. Jan. 26, 2007 <http://www.ctia.org/>

[4] CTIA. Oct. 20, 2006 < http://www.ctia.org/research_statistics/statistics/index.cfm/AID/10202>

As functionality and adoption expand, dependency on mobile technology increases. In a recent survey conducted by Visa USA of 800 consumers, 77 percent of respondents admitted that it would be difficult to get through a single day without their mobile phones, and more than 50 percent preferred to have more electronic payment options so they do not have to carry cash. According to the study, survey respondents are twice as likely to carry their mobile phones than cash, with the 18-to-34-year-old age group four times more likely to carry mobile phones.[5] Many industry experts believe younger generations will play a key role in the adoption of mobile payments. Another study by Javelin Strategy & Research, on incorporating contactless payments into mobile phones, found that nearly 20 percent of consumers ages 18 to 24 say they would be most likely to use their cell phone for contactless payments compared with 8 percent of the 3,215 consumers polled overall.[6]

In some areas of the world, particularly Asia, mobile payments are prevalent. Japan's NTT DoCoMo, for example, implemented the largest and most sophisticated wireless system in the world. Introduced in July 2004, the company's service, known as FeliCa, sold five million wallet phones in its first year.[7] The phone can be used to pay for goods in retail stores, to buy items from vending machines, and to pay for transit fares after January 2006. Technology-friendly consumers in Singapore and Malaysia can use one service, TeleMoney, to pay for transit fares, top off their prepaid wireless phones, buy concert tickets, and make retail purchases.[8]

Despite the success of mobile payments in some geographic locations, the overall uneven adoption of mobile payments throughout the world can be attributed to a number of factors. Differences in laws and payment regulations across borders and industries may affect the suitability of mobile payments for some countries. Additionally, a lack of compelling need can limit new payment types from successfully breaking into markets like the United States that already possess a safe, reliable, and efficient payment system.

On the other hand, developing countries like the Philippines—with less advanced infrastructure—have adopted this new payment method to meet their banking needs. Industry data from 2005 suggests almost 80 percent of the Philippine population do not have bank accounts.[9] Yet, Filipinos send an average of 200 million text messages daily.[10] Remote mobile payments allow these consumers to cash electronic checks and transfer mobile credit from person to person (P2P).

While technology certainly exists to make mobile payments a reality in the United States, there are still some significant obstacles to overcome. Before exploring these barriers to adoption, however, it makes sense to look at the different types of mobile payments that have emerged.

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[5] *Finance Tech*. Aug. 24, 2006 <http://financetech.com/printableArticle.jhtml?articleID=192202409>

[6] "Many Young Adults Would Use Payment Phones." *ISO&Agent Weekly*. 2:53 (Dec. 29, 2006): 8.

[7] The Pelorus Group. *Wireless Payments: The New Payments Paradigm 2004 to 2010*. Sept. 2005: 10.

[8] *Ibid*.

[9] *The Business World Outlook Forum*. Jan. 12, 2005 <http://www.bworld.com.ph/Downloads/2005/OF_Buenaventura.02.05.pdf>

[10] Bulos, Heinz. "Filipinos Are Getting the Message." *BusinessWeek Online*. Nov. 22, 2004.
<http://www.businessweek.com/magazine/content/04_47/b3909072.htm>

# Types of Mobile Payments

There are primarily two types of mobile payments: remote and proximity. Remote payments can be made anytime, anywhere, and do not require a point-of-sale (POS) terminal. They may be P2P or person-to-business (P2B) payments. Proximity payments require the installation of a near field communication[11] (NFC) chip into the mobile device to store the user's account information. For proximity payments, merchants require special POS readers. Typically, proximity payments are P2B. (Examples of high- and low-value proximity and remote mobile payments are outlined in Table 1 above.)

**Table 1: Examples of Mobile Payments**

|  | Proximity | Remote |
|---|---|---|
| **High-Value Venues** | • Retail outlets<br>• Movie theaters<br>• Dining | • e-Commerce outlets<br>• P2P remittance<br>• Bill payment |
| **Low-Value Venues** | • Convenience stores<br>• Fast-food restaurants<br>• Vending machines<br>• Transit and parking | • Content services<br>    ○ Ringtones<br>    ○ Games<br>    ○ Voting |

## Remote Mobile Payments

Remote mobile payments can be initiated using short message service[12] (SMS), also known as text messaging, and wireless application protocol[13] (WAP) technologies. Most mobile phones are equipped to handle SMS functionality and WAP technology, and thus are readily accessible and ubiquitous.

**SMS.** To make mobile payments using SMS, the user must set up an account with a mobile payment service provider (MPSP), for example PayPal or TextPayMe. The user then links a bank account, credit card, debit card, or prepaid card (funding options vary) to the account associated with his or her mobile phone number.

While various MPSPs operate differently, the basic P2P payment process, as outlined below and displayed in Figure 1 (see page 4), is similar.

1. The payer initiating the payment sets up an account with the MPSP.
2. To make the P2P payment, the payer texts a code or command to the MPSP that includes the dollar amount and the receiver's mobile phone number.
3. The MPSP receives the information.
4. The MPSP sends a message back to the payer confirming the transaction and requesting the PIN.
5. Within a few seconds, the payer receives the message.
6. The payer confirms the payment by entering the PIN.
7. The MPSP receives the payer's PIN.
8. The money is transferred to the receiver's third-party account.
9. The MPSP sends the payment information notice to the receiver.
10. The receiver gets payment information almost immediately thereafter.
11. Money can be moved to a bank account or a check can be issued to the receiver.

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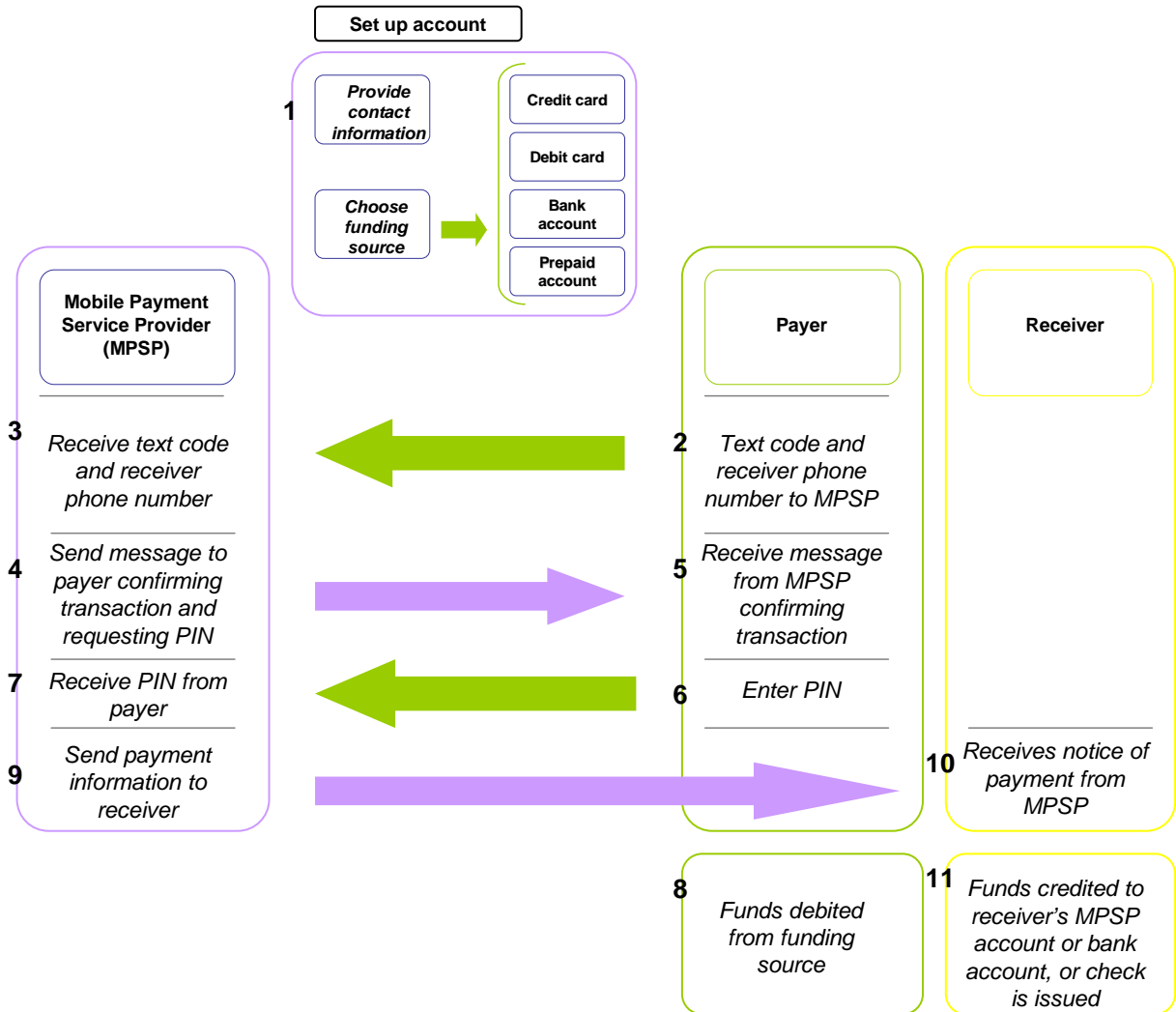[11] NFC is a short-range radio frequency identification (RFID) chip.

[12] SMS is a mobile device feature that allows users to receive and send short text messages (approximately 160 characters) to other mobile devices.

[13] WAP is a secure specification that allows users to access information instantly, particularly Internet content, via handheld wireless devices such as mobile phones and PDAs.

The process is generally the same for making P2B payments; however, any goods purchased are delivered to the address the payer specified with the MPSP after the payment transaction has been completed.

**Figure 1: Remote SMS P2P Mobile Payment Process**

| Set up account | | |
|---|---|---|
| **Provide contact information** | | **Credit card** |
| | | **Debit card** |
| **Choose funding source** | → | **Bank account** |
| | | **Prepaid account** |

**Mobile Payment Service Provider (MPSP)**  **Payer**  **Receiver**

**3** *Receive text code and receiver phone number* ← **2** *Text code and receiver phone number to MPSP*

**4** *Send message to payer confirming transaction and requesting PIN* → **5** *Receive message from MPSP confirming transaction*

**7** *Receive PIN from payer* ← **6** *Enter PIN*

**9** *Send payment information to receiver* → **10** *Receives notice of payment from MPSP*

**8** *Funds debited from funding source*   **11** *Funds credited to receiver's MPSP account or bank account, or check is issued*

Much of the recent hype surrounding mobile payments is due to the numerous entrants to the market and trials in the remote mobile payment space. Most of the MPSPs offer P2P payments, which are gaining a higher profile—an estimated $103 billion of P2P payments are traded annually in situations such as splitting a dinner bill or a cab fare.[14] Eventually, however, a shakeout is likely to occur as the strongest competitors begin to emerge. Table 2 (see page 5) provides an overview of several more prominent players in the remote mobile payment arena and their current payment services.

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[14] Lev-Ram, Michael. "Turning Your Cell Phone into a Wallet." *CNNMoney.com*. July 11, 2006.

**Table 2: Prominent Players in Remote SMS Mobile Payments[15]**

| | Payment Initiation | Payment Authorization | Funding Methods | Withdrawal Methods | Fees | Rewards |
|---|---|---|---|---|---|---|
| **Obopay** | Download application onto handset | PIN entered into Obopay handset application | ACH; bank card; cash; check | ACH; check; debit MasterCard | Sender pays 10 cents | $5 for sign-up; and $5 referral promotion |
| **PayPal Mobile** | SMS-based | Call back; enter PIN | PayPal account (ACH, cards, funds in PayPal account) | PayPal withdraw options; PayPal debit card | Same as PayPal online | None |
| **TextPayMe** | SMS-based | Call back; enter PIN | ACH; bank card | Wire to checking account; mail check | Free | $5 for sign-up; and $5 referral promotion |

*Note: Numerous other competitors have entered the market; some are just beginning to offer payment services, while others are no longer in business.*

**WAP.** Users can initiate remote mobile payments with WAP technology, which uses wireless communication to access information, particularly Internet content, from a mobile device. Payments can be made directly from a website or by downloading a mobile payment application that may utilize WAP or SMS technology to make a payment.

Purchases made via a web browser[16] with a mobile device can occur in the same manner as traditional online purchases: by visiting a website and providing contact and payment information at checkout. However, currently in the United States, which is a PC-centric market, Internet access from a wireless device is low as compared to Europe and Asia-Pacific markets. In June 2006, as few as 34.6 million U.S. mobile subscribers (16 percent) accessed the Internet from a wireless device.[17]

Additionally, purchases can be made and account information can be accessed using mobile payment applications that can be downloaded onto a phone in one of several ways. Users can request that an MPSP, such as Obopay, push a WAP message (e.g., SMS message with a clickable WAP-based link) to the user's mobile phone. Once the user receives the message, he or she can download the application as instructed. Alternatively, the user can access a webpage on a mobile phone browser to initiate the process.

WAP capabilities can also be utilized when making content purchases such as ringtones, graphics, and games. Purchase applications may already exist on the mobile phone, or may be downloaded using WAP. Users select the content they would like to purchase and complete the transaction as instructed. Typically, subsequent charges appear on the next monthly mobile phone bill. Content purchases are usually small-value transactions (under $5), often referred to as "micropayments." While the total value of all mobile content purchases is not available, Qpass, a major supplier of mobile content billing services for mobile carriers, has processed over $1.5 billion of mobile content purchases since its launch in 2003.[18]

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[15] *Glenbrook Payments News*. April 8, 2006 <http://www.paymentsnews.com/mobilecomparisons.html> and company websites: <https://www.textpayme.com/us/secure/index.tpm> <http://www.paypal.com> <https://www.obopay.com>

[16] A web browser is a software application used to access and interact with webpages on the Internet, such as Internet Explorer and Netscape.

[17] Gauntt, John and Mackline, Ben. "Where Are All the Mobile Internet Users?" Aug. 24, 2006 <http://www.emarketer.com/Articles/Print.aspx?1004129>

[18] Wallis-Jones, Seth. "Ring Tones Still Driving Mobile Content Sales, Says Qpass." *Global Insight Daily Analysis.* Oct. 17, 2006.

## *Proximity Mobile Payments*

Proximity mobile payments require the exchange of payment information between a consumer's mobile device and a merchant's POS terminal. Using NFC technology, payments are made much like those with contactless plastic cards—account information is stored on a chip in the mobile device, which consumers tap or wave at a POS terminal.

The primary difference between contactless mobile payments and proximity mobile payments is that the NFC chip must be installed in the mobile device. This not only increases the number of players involved in the payment process, but also adds complexity to the value chain. Collaboration among all parties (see Figure 2 on page 7) is vital to the success of mobile payment adoption. Following are some of the key players and key considerations for supporting the adoption of mobile payments; obstacles hindering the adoption of mobile payments are discussed later.

*Consumers*, the ultimate end users, may increase their payment convenience by adopting mobile payments.

*Merchants* install mobile-capable readers at a POS terminal to accept mobile payments from consumers, which may increase efficiency at the POS and enhance customer loyalty by providing more branding and marketing opportunities.

*Card associations and financial institutions* process mobile payments and entice consumers to become mobile payment users and merchants to become mobile-capable at the POS. The adoption of mobile payments may provide card associations and financial institutions with an opportunity to extend their brands and services, which could lead to an increased customer base, higher retention, additional cross-selling opportunities, and increased revenue from higher volume.

*Mobile handset manufacturers* install NFC-secure chips into mobile handsets to enable payments using a mobile device. Mobile handset manufacturers could gain a competitive advantage by offering mobile phones that support NFC capability.

*Wireless carriers* offer NFC-capable mobile phones to consumers. Mobile payments could provide wireless carriers with an opportunity to obtain additional revenue from increased network usage.

Additionally, new players, such as contactless reader manufacturers and NFC chip manufacturers, have an opportunity to increase revenues.

**Figure 2: Primary Parties Involved in Adoption of Mobile Payments**
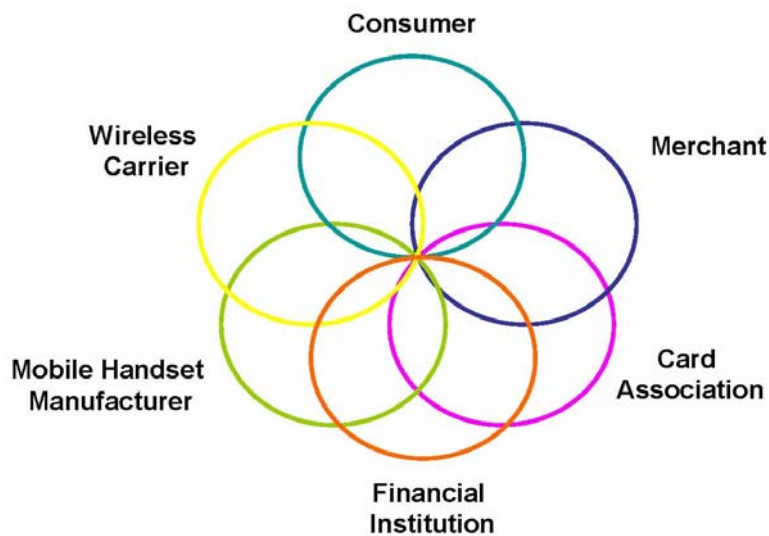


While proximity mobile payments are not yet used by the general public in the United States, several targeted trials have recently been conducted. (Trial initiatives are outlined in Appendix 1.)

The Atlanta Philips Arena NFC Trial, the industry's first large-scale trial, is one that has been highly publicized. After the completion of the trial with 150 participants, focus group feedback indicated that participants:

- "Overwhelmingly embraced the technology" which "significantly improved" their arena experience
- "Would like to use their mobile devices for payments at a variety of merchant locations, for any purchase size, and see value in accessing multiple payment accounts on their mobile devices in the future"
- "Expressed interest in having multiple applications on a single mobile device, including transit, loyalty, and digital content applications."[19]

It should be noted, however, that trials are highly controlled, and the parties involved are very proactive in reaching small and focused audiences—a far stretch from real-world implementation.

## Challenges to the Adoption of Mobile Payments

Until recently, expectations for mobile payments could not be met because of the difficulties of implementation. Today in the United States, there is a renewal of interest and activity. Some industry experts even predict a coming mobile revolution[20] now that the mobile device has reached mass adoption and mobile payments have proven successful in other areas of the world.

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[19] Visa USA. "Consumers Give Two Thumbs Up to First North American Mobile Phone Payment and Content Trial." Sept. 6, 2006. <http://www.usa.visa.com/about_visa/press_resources/news/press_releases/nr341.html>

[20] Goode, Alan. *Mobile Commerce Strategies: Ticketing, Retail, Payment, and Security*. Juniper Research. May 2006.

Nevertheless, a number of barriers continue to impede widespread acceptance of mobile payments in the United States. The overlapping industries need to identify their respective places in the value chain and determine viable and equitable business models. Moreover, mobile payments must provide users with significant added value, such as cost savings and convenience, in order to generate demand.

Remote mobile payments, unlike proximity payments, face fewer barriers. For one, no installation of an NFC chip into the mobile device is needed. Payments are completed using existing mobile phone technology; and because payments are remote, merchants do not need to upgrade their POS terminal equipment.

An additional advantage in the remote payment arena is that MPSPs, while leveraging existing payment infrastructure, have stepped in to fill the gaps of financial institutions, card processors, and wireless carriers. Therefore, MPSPs can implement new services without delays related to cross-industry collaboration. However, many MPSPs—still in the beta phase—continue to search for the business model that will be sustainable in the long run. Proximity payments seem to offer such a solution.

The next section is dedicated to proximity payment technology, which, while more viable, has significant hurdles in the short term. Outlined below are a number of issues that need to be resolved before mass adoption of mobile payments may occur.

## *Supply-Side Challenges*

**WIRELESS CARRIERS, FINANCIAL INSTITUTIONS, AND CARD ASSOCIATIONS**
**Ownership of the Customer Relationship.** One issue is to determine who will maintain the primary relationship with the consumer. The party that controls the billing and collection will also have a competitive advantage because of its access to proprietary customer information—information that can be used to improve marketing and sales opportunities.

Historically, mobile carriers have owned the customer billing and collection process for mobile services. However, for proximity payments to succeed, the ownership and development of an effective and efficient billing and collection system for mobile payments needs to be determined. The party that assumes this role—which may be card associations, financial institutions, wireless carriers, or mobile payment service providers—must share in the costs of managing the billing process, including additional resources such as customer service.

**MOBILE HANDSET MANUFACTURERS**
**Equipment of Mobile Handsets with NFC Chips.** In order to enable proximity mobile payment capabilities in the mobile phone, a costlier NFC technology needs to be installed. However, most mobile handset manufacturers first need to be convinced that the merits outweigh the costs of installing the technology on their phones. An exception is Nokia, a strong supporter of NFC technology and a participant in several mobile payment trials, which expects to introduce the first commercially available NFC-enabled phone, Nokia 6131, in the first quarter of 2007.[21] Whether there will be demand from consumers beyond trial participants remains to be seen.

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[21] *CardTechnology*. "Nokia Announces New NFC Phone." Jan. 11, 2007
<http://www.cardtechnology.com/article.html?id=20070111BL8SNSDT>

As other mobile handset manufacturers and mobile carriers work to find an effective business case, industry predictions on the penetration of NFC-enabled phones vary. As displayed in Figure 3, research firm IDTechEx. Ltd. forecasts North America will account for 19 percent of 300 million global NFC-enabled phone sales in 2010, and 28 percent of 600 million global sales in 2013. [22] Another firm, ABI Research, adjusted down its forecast of mobile phones that would incorporate NFC. In March 2006, the firm predicted 50 percent (500 million units) of mobile phones

**Figure 3: Sales of NFC-Enabled Phones in Millions**



Source: IDTechEx. Ltd.

worldwide would incorporate NFC by 2010. According to a revised September 2006 forecast, the firm now estimates 30 percent (450 million units) of mobile phones will be NFC-enabled by 2011.[23]
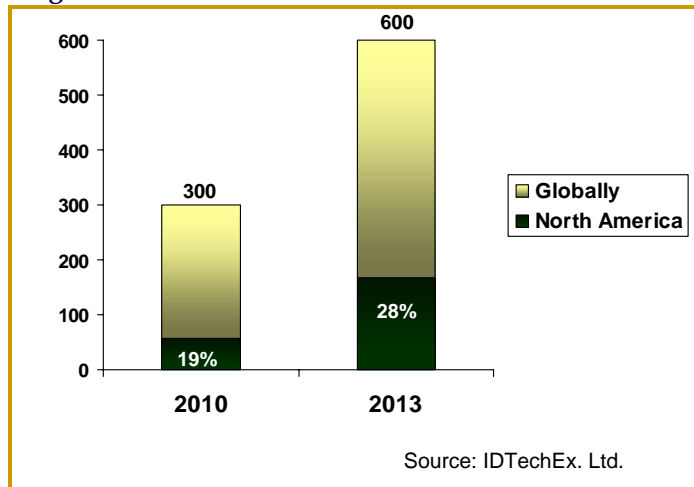
**Universal Standards and Interoperability.**  Standards will help establish interoperability so that any mobile payment method can be used at any merchant location. There are ongoing activities to encourage NFC standardization and adoption.

The NFC Forum, a nonprofit industry-related association advancing the use of NFC technology, is working to develop international standards. In June 2006, the NFC Forum announced the publication of its first four specifications, which will make it possible for any manufacturer to create NFC Forum-compliant devices that are interoperable with other manufacturers' devices and compatible with the NFC Forum-compliant offerings of service providers, ensuring successful communication between devices and chips.[24]

Furthermore, financial institutions providing contactless payment programs have already specified standard ISO 14443-based radio frequency technology to support contactless payments, which are used today in MasterCard PayPass and American Express ExpressPay.[25] These specifications allow the same interface to be used between mobile phones and contactless POS systems.

**MERCHANTS**
**Acceptance of Mobile Payments at Merchant POS Systems.** Fortunately, contactless payment programs are laying the groundwork for mobile payments. A large number of national retailers, such as CVS, 7-Eleven, and McDonald's, have installed contactless POS readers for card access. If and when mobile payments emerge, these readers will be compatible at POS.

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[22] Oehlsen, Nadia. "NFC Standoff." *Cards&Payments*. Jan. 2007: 31-37.

[23] *Payment News*. "NFC Forecast Reduced Due to Challenges in Payments." Sept. 11, 2006
<http://www.paymentsnews.com/2006/09/nfc_forecast_re.html.>

[24] NFC Forum. Aug. 14, 2006 <http://www.nfc-forum.org/news/nfc_forum_press_releases/NFC_Forum_First_4_Specs_14Aug06.pdf.>

[25] *Smart Card Alliance*. "Mobile Payments at the Physical Point-of-Sale: Assessing U.S. Market Drivers and Industry Direction." April 2005: 41.

However, the age-old "chicken and egg" dilemma is a barrier to complete adoption. Many merchants are not willing to invest in changing or expanding their payment acceptance methods unless they are certain consumers will use them. In turn, many consumers will not use a payment method unless it is widely accepted by merchants.

## *Demand-Side Challenges*

### CONSUMERS

**Ownership of the Customer Relationship.** As noted earlier, wireless carriers, financial institutions, and card associations must decide who owns the customer relationship, including the billing and collection process. It is important that the selected model satisfy the customer. The parties should have a clear understanding of consumer preferences, which should be a key consideration in the decision-making process. For example, consumers are more comfortable providing financial information to their banks.[26] There may be some reluctance to provide this information to other parties, such as mobile carriers. Differences and preferences among segmented markets such as the unbanked, who do not necessarily have the same trust in traditional financial institutions, should also be considered.

**Usability.** It must be easy and simple for consumers to make purchases and for merchants to receive payments using a mobile phone. The process should be as straightforward as using a credit or debit card today.

**Security.** Today, consumers show heightened awareness of and sensitivity to security and privacy issues. Based on a survey by Forrester Research of consumers on their concerns related to issues restricting the growth of mobile payments, 52 percent consider credit card security to be the major inhibitor of growth to mobile commerce; 15 percent of the consumers surveyed feel completely comfortable sending their payment card details over mobile networks, and 65 percent claim to be "averse" to sending confidential information.[27]

It is important that the authentication process be clearly defined and confidentiality of payment information and integrity of consumer data be ensured. For example, what security features will be required for mobile purchases (e.g., PIN requirements at the POS); what measures will be in place to prevent fraudulent purchases from being made if a mobile phone is lost or stolen; and, will users be permitted to enable payment functionality at the time of payment and to disable it at other times? As questions such as these are addressed, consumer usage and trust in the mobile payment network may grow.

**Value Proposition.** As mentioned earlier, consumers are unlikely to adopt a new payment method unless it provides significant added value, such as cost savings and convenience. In the United States, consumers are generally content with their current payment options. While behaviors are shifting toward electronic payments, there is no evidence that they are actively seeking new alternatives.

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[26] TrustE/TNS Online Privacy Survey Results, Dec. 6, 2006 <http://www.truste.org/about/press_release/12_06_06.php>

[27] *Mobile Payment Forum*. "Enabling Secure, Interoperable, and User-friendly Mobile Payments." Dec. 2002: 6.

It is important that proponents educate consumers on the benefits and value of mobile payments. For example, speedier checkout times, less "fumble time" (i.e., digging for or through a wallet), and added discount features like receiving e-coupons on a mobile device might be appealing to consumers. It is equally important to address misperceptions particularly related to security.

Perhaps more research needs to be conducted to determine the "compelling" reasons why a consumer would want or need to substitute mobile payments for traditional or other electronic payment methods.

# Conclusion

Through a series of briefings, we will continue to monitor how mobile payments progress and the impact any developments may have on consumers. The adoption of mobile payments may accelerate as consumer preferences and technology evolve. Therefore, it is important to look at the future of mobile payments in a broader context than existing consumer payment choices, mobile phones, and mobile services. For example, how might the integration of banking services into a mobile phone, which allows consumers to perform banking activities such as check balances and transfer funds, impact the use of mobile payments? What effect will the behavior of consumers and their use of contactless payments have on mobile payments—will contactless cards fulfill consumer needs for convenience and speed, thus hindering the migration from cards to mobile phones? Will security issues stand in the way of consumer adoption? Finally, what impact will younger generations have on mobile payments—will they be the pioneers of this new frontier?

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The Emerging Payments Research Group (EPRG) is a multi-disciplined team of senior payments professionals and economists, both full-time and part-time, who work together to research, understand, and educate key stakeholders on consumer payment behaviors and their impacts on the payment system.

The team conducts quantitative and qualitative research and analysis of consumer payment behavior data and related risks, based on conference findings, literature research, survey data, and developing partnerships with private and academic sectors. The EPRG also keeps abreast of trends in the emerging payments space.

The mission of the EPRG is to perform research and analysis and to provide a forum for information exchange, education, and dialogue on emerging issues in payments from the consumer perspective, emphasizing cross-functional collaboration and building broader expertise in consumer payments.

**EMERGING PAYMENTS**
RESEARCH GROUP

## Appendix 1:  Proximity Mobile Payment Trials[28]

| Trial | Launch Date | Audience/ Users | Types of Purchases | Bank/ Credit Card | Wireless Carrier | Mobile Device | Contactless Reader |
|---|---|---|---|---|---|---|---|
| **Atlanta Philips Arena NFC Trial** | December 2005 | 150 Atlanta Thrasher and Atlanta Hawk season ticket holders | Concession goods at stadium; content from smart posters featuring the trial symbol | Chase-issued Visa | Cingular Wireless | Nokia | VIVOtech |
| **Dallas NFC Mobile Phone Payments Trial** *(sponsored by MasterCard, Nokia, and 7-Eleven)* | November 2006 | Up to 500 participants from 7-Eleven Speak Out wireless program | 32,000 locations worldwide that accept MasterCard PayPass | MasterCard PayPass | Cingular Wireless | Nokia | n/a |
| **New York City Mobile Trial** | December 2006 | Unspecified number of NYC-area residents, Cingular Wireless accountholders, and cardholders of Citi-issued MasterCard with PayPass (contactless feature) | Stores and locations where MasterCard PayPass is accepted; content from smart posters featuring the trial symbol | Citi-issued MasterCard | Cingular Wireless | n/a | VIVOtech |

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[28] Based on author's analyses of company websites and news releases.

**Appendix 2: Glossary**

| ACRONYM | NAME | DEFINITION |
|---|---|---|
| | **Contactless Payment** | Payment made by tapping or waving a card with an embedded near field communication (NFC) chip at a contactless POS reader. |
| IC | **Integrated Circuit or Chip** | Electronic component that performs logic, processing, and memory functions; also called a *chip*. |
| ISO-14443 | **International Standards Organization** | The most widely used contactless standard in the world, at present mainly for transport applications. It is becoming very popular for payment and ID applications due to its multi-application features and high security level. |
| MPSP | **Mobile Payment Service Provider** | A generic term used to describe a third party that provides mobile payment services to consumers. |
| NFC | **Near Field Communication** | A short-range radio frequency identification (RFID) wireless technology. |
| P2B | **Person-to-Business Payment** | The exchange of financial value between a person and a business. |
| P2P | **Person-to-Person Payment** | The exchange of financial value from one person to another. |
| | **Proximity Payment** | Generic term used to describe a face-to-face payment that is enabled through short-range wireless technology such as near field communication (NFC). |
| RFID | **Radio Frequency Identification** | A method of identification using radio waves that transmits data to an RFID reader. Chip-based RFID tags, often associated with contactless payments, contain silicon chips and antennae. |
| | **Remote Payment** | Generic term used to describe a payment that does not require face-to-face interaction at point of sale (POS). |
| SMS | **Short Message Service** | A mobile device feature that allows users to receive and send short text messages (approximately 160 characters) to other mobile devices. |

| ACRONYM | NAME | DEFINITION |
|---|---|---|
| **WAP** | **Wireless Application Protocol** | A secure specification that allows users to access information instantly, particularly Internet content, via handheld wireless devices such as mobile phones and PDAs. |
| | **Web Browser** | A software application used to access and interact with webpages on the Internet such as Internet Explorer and Netscape. |