Proximity Mobile Payments: Leveraging NFC and the Contactless Financial Payments Infrastructure

A Smart Card Alliance Contactless 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. The Alliance membership includes leading companies in banking, financial services, computer, telecommunications, technology, health care, retail and entertainment industries, as well as a number of government agencies. 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 visit http://www.smartcardalliance.org.

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1. Introduction

"The convergence of payments and mobile communications is not just logical—it is inevitable." In March 2007, John Philip Coghlan, then CEO of Visa USA, made this announcement at the CTIA Wireless Conference. Yet only a few years ago, people were still saying, “Some day, we will pay using mobile phones.” The Smart Card Alliance and related industry groups representing financial institutions, merchants, and mobile operators have talked and written about “some day” for almost a decade. But now, virtually every industry group involved in the transaction chain is investigating the use of mobile payments. And mobile payment will soon be a standard transaction method for payment in many North American merchant locations.

What has happened to move mobile payments from “some day” to “inevitable?”

- **Contactless payment adoption by payment brands, issuers and consumers**. American Express, Discover Network, MasterCard, and Visa have issued contactless payment cards and devices based on a single standard. These contactless payment products (ExpressPay™ from American Express, Discover® Network Zip℠, MasterCard® *PayPass*™ and Visa payWave™) have shown both merchants and consumers the benefits of contactless payments. Consumers enjoy increased security, speed, and ease-of-use.
- **Contactless payment acceptance by merchants**. Merchants have seen the benefits of faster transaction time, increased spending and increased customer loyalty. Plus, transactions using contactless cards and devices are processed through a single, contactless-enabled point-of-sale (POS) system and through the existing financial networks, encouraging merchant adoption.
- **Mobile phone ubiquity**. Mobile phone subscribers don't leave home without their phones. In addition, near field communication (NFC) technology has established communication standards that can facilitate a simplified and robust implementation of contactless payments using the mobile device. NFC, a short-range, standards-based wireless connectivity technology, will soon be available as standard functionality in most mobile phones. NFC will allow consumers to perform safe, contactless transactions, access digital content, and connect electronic devices simply.[1] An NFC chip in a mobile device can act as a card and/or a reader – enabling consumer devices to connect, receive and share information, content and data, in addition to making secure payments quickly.
- **Expanded mobile functionality**. The mobile device can deliver a variety of payment and payment-related services. The mobile device is a powerful new tool that can enable proximity mobile payments, remote payments through the mobile Internet or text messaging, and person-to-person money transfers. Value-added applications can enrich the purchase experience and include account management, banking, offers, and security applications.

What would drive a consumer to adopt and use mobile payments? The answer may be expanded payment functionality, increased convenience, enhanced security, and faster transactions.

The debate about who is going to build and deploy the infrastructure for mobile commerce has gone on for years. Some argued that the mobile operator would take on the payment process; others, that the financial institutions would deploy readers, software, and the necessary technologies. With the introduction of contactless financial payment cards and NFC-enabled phones, however, the debate is getting more interesting.

[1] NFC Forum, “One Year after Launch, NFC Forum Membership hits 70 Organizations Worldwide," press release, February 22, 2006

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1.1 What Are Mobile Payments?

Mobile payments are payments for goods or services initiated from a mobile phone or similar device (such as a personal digital assistant or smart phone). Juniper Research has estimated that the total transaction value from all mobile payments will grow from just above $2 billion in 2007 to nearly $22 billion by 2011.[2]

According to the Federal Reserve Bank of Boston,[3] there are two kinds of mobile payments:

- Remote mobile payments
- Proximity mobile payments

1.1.1 Remote Mobile Payments

Remote mobile payments may use a variety of mobile phone data channels to initiate a transaction.[4] Most mobile phones deployed over the last 5 years are equipped with functionality that can enable remote mobile payments.

Practical use cases for remote mobile payments may include making purchases from a web merchant via the mobile phone, paying a merchant who does not have traditional acceptance capabilities for physical goods, or paying a merchant for a purchase of digital goods. Remote mobile payments may be implemented using the existing financial payments infrastructure (e.g., for payment at a web merchant) or using a closed loop mobile payments system.

One example of a remote mobile payment process is as follows:

- The consumer and merchant set up an account with a trusted third party or mobile payment service provider (MPSP).
- When a transaction is initiated, a short message service (SMS) message is sent to the MPSP. Authentication may take a variety of forms, including entry of secret passwords, validation of handset hardware information, or verification of other sender personal information.
- After the transaction request is received and authenticated, the MPSP transfers funds from the consumer's account into the merchant's account and notifies the merchant that the funds have been transferred.
- In a closed loop system, the merchant may then move the funds into a standard bank account.

Remote mobile payments are ideal for use in markets that require person-to-person payments and for under-banked consumers and merchants who are not part of the normal POS acquirer payment process, such as flea market vendors and seasonal outside vendors.

1.1.2 Proximity Mobile Payments

Proximity mobile payments leverage the financial industry's payment infrastructure. An NFC-enabled phone is provisioned with a version of the payment application (i.e., credit or debit card) issued by the consumer's financial institution. The application and payment account information are encrypted and loaded into a secure area in the phone. The phone uses the built-in NFC technology to communicate with the merchant's contactless payment-capable POS system, similar to the contactless payment cards and devices in use today. The payment and settlement processes are the same processes used when the consumer pays with a traditional contactless or magnetic stripe credit or debit payment card.

Proximity mobile payments can be made at both attended POS locations (such as stores) and unattended locations (such as vending machines) that use the existing merchant payments

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[2] Juniper Research, "Paying by Mobile," July 2007
[3] Federal Reserve Bank of Boston, "Mobile Phones: The New Way to Pay," industry briefing, February 2007
[4] Data channels used may be short message services (SMS), wireless application protocol (WAP) or the Unstructured Supplementary Service Data (USSD) protocol.

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infrastructure. To pay, the consumer simply brings the phone to within a few inches of a contactless-payment-capable POS system and the transaction occurs. The process is the same as that used by the contactless credit and debit cards currently being deployed in the United States.

Figure 1 illustrates the mobile payments applications landscape for both remote and proximity payments.

The most obvious differences between proximity and remote mobile payments are speed, convenience, and the fact that NFC payments use the existing financial payments processing infrastructure. There is no need to set up payment processes or accounts with a third party, and the proximity mobile payment data is linked directly to a payment card issued to the consumer by a trusted financial institution.

This white paper will focus on the implementation of proximity mobile payments using NFC-enabled mobile devices and the contactless financial payments infrastructure.

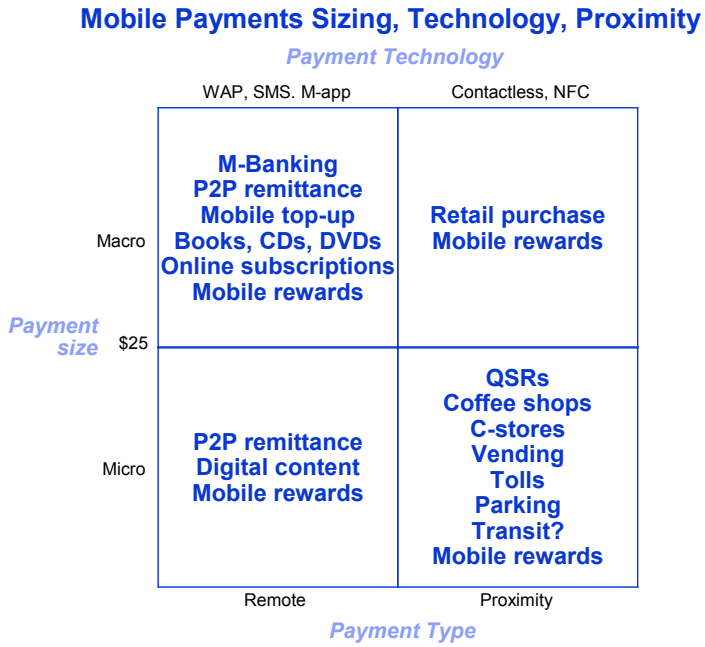

Figure 1: Mobile Payments Landscape[5]

1.1.3 Stakeholders in the Proximity Mobile Payment Environment

Implementing proximity mobile payment is complicated by the number of stakeholders that are involved in establishing the eco-system. Consumers, merchants, payment brands, issuing banks, mobile operators, mobile handset manufacturers and other application and service providers must cooperate to deploy a fully functioning system that delivers benefits to all parties.

Figure 2 illustrates stakeholders that may be involved in proximity mobile payments.

[5] Mercator Advisory Group, "US Mobile Banking and Mobile Payments: Finding the Seams, Accelerating the Pace"

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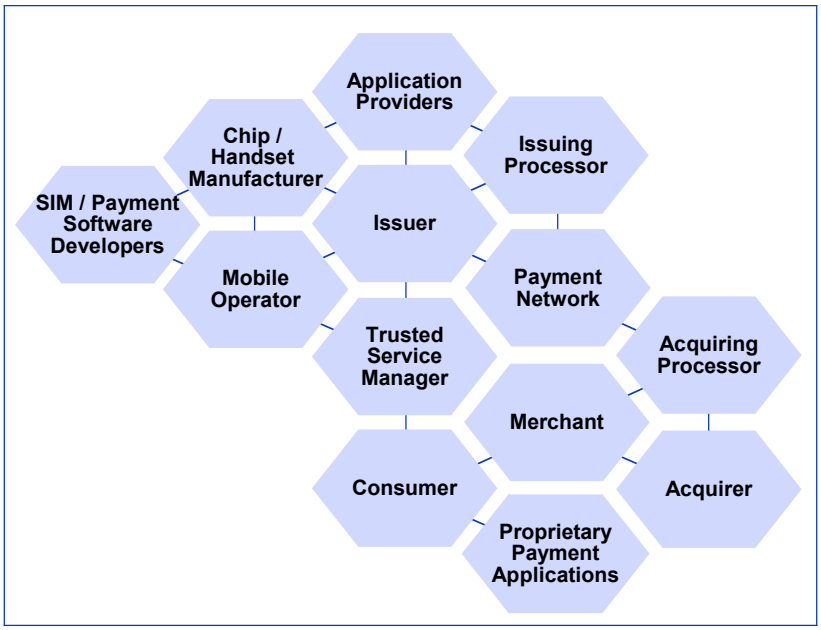

Figure 2: Stakeholders That May Be Involved in Proximity Mobile Payments

1.2 Current Proximity Mobile Payment Programs

Mobile payment programs have been running successfully for over a year throughout the world, especially in Asia. Some programs are led by mobile operators; others, by financial groups. Still others are run jointly by operators and banks. Payment brand executives and merchants are focusing on the convergence of payment methods both internationally and in North America. International opportunities have included the following:

- In June 2007, French mobile operator Orange announced that it will launch mobile services in Bordeaux, France in early 2008. Subscribers will be able to use their NFC-enabled phones for retail purchases, transit fare payment and information download from advertising posters.[6]
- In April 2007, MasterCard initiated an NFC mobile phone payment trial with PayPass capability in Hong Kong in partnership with the Hong Kong Retail Technology Industry Association, the Hong Kong Wireless Technology Industry Association, Nokia, and ViVOtech.[7]
- In the first quarter of 2007, MasterCard celebrated a milestone in Korea, when over 60,000 PayPass-enabled mobile handsets were issued.[8]
- In February 2007, MasterCard, in cooperation with Taiwan Mobile, Taipei Fubon Bank, and ViVOtech, launched MasterCard PayPass in mobile phones in Taiwan. MasterCard worked closely with the industry to leverage NFC and over-the-air (OTA) technology to allow Fubon Bank cardholders to download PayPass cards and promotion coupons to their NFC-enabled phones.[9]

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[6] Card Technology, "Orange to Launch Mobile-Contactless Service in Early 2008, June 29, 2007
[7] MasterCard, "MasterCard Pioneers Innovation in Payments with NFC–Enabled Mobile Phones," press release, April 14, 2007
[8] MasterCard, "A New Way to Pay - Mobile Commerce Momentum at MasterCard," MasterCard report, June 2007
[9] MasterCard, "MasterCard, Taipei Fubon Bank and Taiwan Mobile Cooperate to Develop Next Generation Credit Card Payment Device," press release, February 7, 2007

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- In February 2007, Visa and SK Telecom announced plans to launch what is expected to be the world's first mobile contactless payment using a Universal SIM card personalized OTA. This solution is based on Visa's mobile platform. This large-scale service will initially involve 30,000 SK Telecom subscribers and 50,000 point-of-sale locations.[10]
- In January 2007, Visa launched a mobile platform, paving the way for worldwide commercial deployment of mobile payments and services.[11] The platform resulted from a series of global trials and was developed in collaboration with a number of wireless stakeholders.
- In June 2006, JCB, in cooperation with KPN, CCV Holland B.V., Gemalto, Nokia, PaySquare, NXP and ViVOtech, launched an NFC mobile phone pilot in Amsterdam, Netherlands. Selected JCB card members were supplied with Nokia mobile phones equipped with NFC chips loaded with the JCB payment application.[12]
- In 2006, Visa launched a mobile payment program in Japan in cooperation with DC Card, UJF-Nicos, KDDI, Softbank and NTT Docomo.[13]
- In 2006, Visa launched contactless mobile payment with Maybank, Maxi, Nokia and ViVOtech in Malaysia.[14]
- In 2005, Visa launched SMS-based purchases of goods via mobile phone at retail outlets with Airtel in India. An integrated Visa payment function on mobile phones using SMS enabled Airtel subscribers in India to purchase goods via mobile phone at 100 retail outlets. Merchants also used their mobile devices as point-of-sale terminals.[15]

Recent examples of North American proximity mobile payment programs include the following:

- In June 2007, Visa and Wells Fargo announced the launch of an extensive mobile pilot to test consumer mobile payments and services using mobile devices equipped with NFC technology. The pilot will test secure, over-the-air delivery of payment account information to the mobile device, mobile payments in stores and restaurants accepting Visa payWave technology, receiving and redeeming mobile coupons, and account management services.[16]
- In June 2007, Cellular South announced the launch of the first-ever consumer trial of its WirelessWallet service based on the Kyocera biometric NFC phone and ViVOtech wallet software. This service allowed consumers to open their mobile wallets on NFC mobile phones using their fingerprint.[17]
- In March 2007, MasterCard and Mobile Candy Dish launched a pilot in Chicago to enable consumers to advance order movie tickets and to purchase concessions in real-time using an NFC phone. Consumers can also get directions, maps and a list of nearby points of interest including restaurants, shopping malls, and gas stations.[18]

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[10] Visa International, "Visa and SK Telecom announce plans to launch mobile payments using Universal SIM card and over-the-air technologies," press release, February 8, 2007
[11] Visa, "Visa Launches Mobile Platform," press release, January 8, 2007
[12] JCB, ViVOtech, "JCB and ViVOtech launch Near Field Communication (NFC) mobile payment pilot project in The Netherlands with six major players," press release, June 12, 2006
[13] Visa International, "Visa International to Introduce Open Platform for Card and Mobile Contactless Payments," press release, March 16, 2006
[14] Visa International, "Visa Launches World's First Mobile Visa Wave Payment Pilot in Malaysia," press release, April 27, 2006
[15] SBI, "SBI Launches Visa Pre-Paid Cards on the mChq Platform," press release, October 27, 2005
[16] Visa USA, "Wells Fargo, Visa Launch Mobile Payment Pilot," press release, June 27, 2007
[17] Cellular South, "Now Your Cell Phone Can Pick Up the Tab - Cellular South Launches First Multi-City Wireless Wallet Trial," press release, June 6, 2007
[18] Mobile Candy Dish, "Marcus Theaters and Mobile Candy Dish Make Long Lines a Thing of the Past," press release, March 9, 2007

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- In February 2007, Discover Financial Services and Motorola Inc. launched a mobile payment and account management trial that enabled participants to check their Discover Card account balances, review payment history, and make purchases using their mobile phones in place of the traditional plastic credit card.[19]
- In January 2007, HSBC launched a mobile phone payment pilot in partnership with MasterCard and ViVOtech. Using a simple OTA personalization process, participants in New York, Chicago, and several other large U.S. cities loaded their HSBC credit cards onto their mobile phones. Participants are able to use their NFC phones at thousands of PayPass-enabled merchant locations nationwide. Recently, HSBC has extended the pilot to allow its debit cards to be downloaded onto NFC mobile phones, resulting in the first multi-card NFC mobile phone pilot.[20]
- In December 2006, Citigroup, MasterCard, Cingular, and Nokia announced a team effort to pilot next-generation mobile phones using NFC technology with "Tap & Go™" capabilities in New York City, using software and services provided by Giesecke & Devrient and ViVOtech.[21]
- In November 2006, MasterCard Worldwide announced a market trial of the use of NFC-enabled mobile phones for "Tap & Go" payment in partnership with Nokia, 7-Eleven, Inc. and Peoples Bank of Paris, Texas.[22]
- In December 2005, Visa participated in a first-of-its-kind NFC trial for mobile phone proximity payment and content downloads in the Philips Arena in Atlanta, working with Philips Semiconductor (NXP), Nokia, Cingular, Chase and ViVOtech.[23]

Since the fall of 2006, initiatives related to developing, testing, piloting, or building proximity mobile payment programs have been announced virtually every week. Many stakeholder industry groups are working toward making mobile payments a reality, including:

- Global Platform
- MOBEY Forum
- Mobile Payment Forum

1.3 Expectations for Proximity Mobile Payment Deployment

As of April 2007, it is estimated that North American consumers had more than 21 million contactless credit and debit cards[24] and approximately 55,000 merchant locations[25] worldwide were equipped with contactless-capable POS systems.

The number of merchant locations ready and able to accept contactless (and NFC-enabled) payments is already extensive, and it is growing. Figure 3 shows a map of merchant locations in the U.S. that accept contactless transactions as of June 30, 2007.[26] Although contactless payments started on the East Coast of the United States, West Coast banks such as Wells Fargo are now issuing contactless payment cards, which will encourage the growth of proximity mobile payment, since the use of high-end mobile devices appears to be quite popular on the West Coast.

[19] Discover and Motorola, "Discover Network and Motorola Announce Mobile Payments and Account Management Trial," press release, February 13, 2007
[20] HSBC, "HSBC Launches Mobile Phone Payments Pilot," press release, January 26, 2007
[21] Nokia, "Citigroup, MasterCard, Cingular and Nokia team to pilot next generation mobile phone with "tap & go" payment in New York City," press release, December 14, 2006
[22] MasterCard, "MasterCard Leads Nation's First Market Trial of Personalized NFC-Enabled Mobile Phones for Payment," press release, November 2, 2006
[23] Atlanta Spirit, Chase, Cingular, Nokia, Philips, Visa USA, ViVOtech, "Industry Leaders Announce First Large-Scale Near Field Communication Trial in North America," press release, December 14, 2005
[24] Source: Smart Card Alliance, based on industry sources.
[25] MasterCard, MasterCard PayPass Performance Insights, http://www.paypass.com/performance_insights.html
[26] MasterCard, June 30, 2007

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According to a Federal Reserve Bank of Boston report,[27] the growth in the number of NFC-enabled phones is almost as large. According to IDTechEx, Ltd., the sales of NFC-enabled phones in North America will increase to 57 million by 2010 and 168 million by 2013.

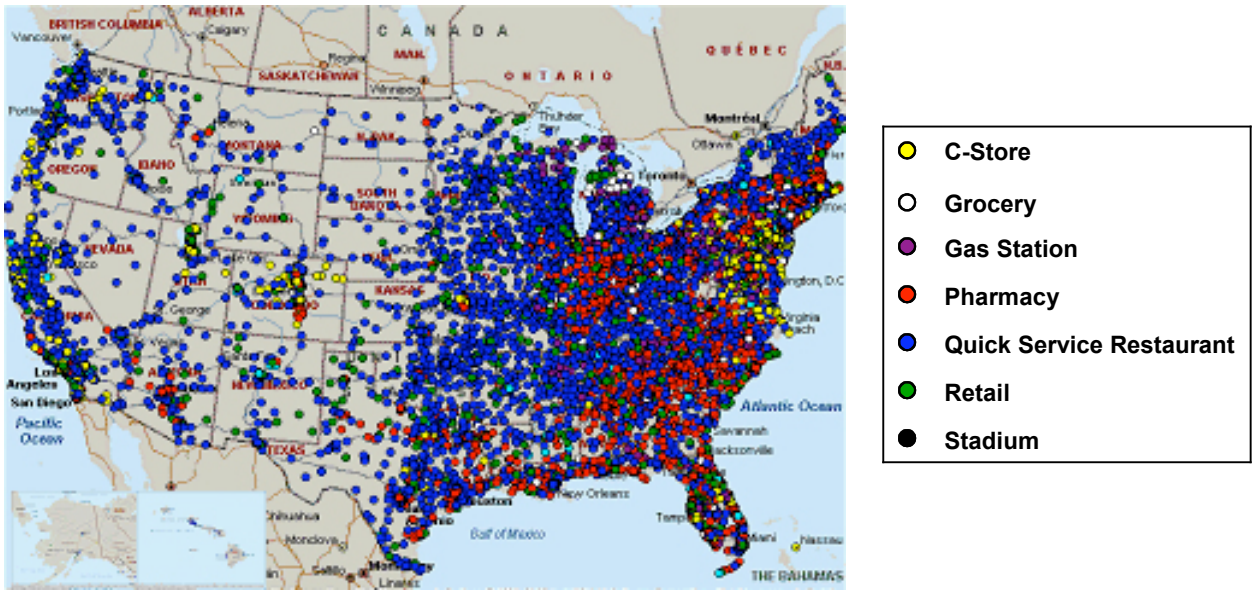

Figure 3: Contactless Acceptance at U.S. Merchants - June 30, 2007[26]

1.4 About this White Paper

This white paper outlines the findings and conclusions of the Smart Card Alliance Contactless Payments Council. Specific to proximity mobile payment, it is the conclusion of this Council that proximity mobile payment, because it leverages the well-established financial payments infrastructure, and because it is based on NFC technology and the ISO/IEC 14443 standard, will become the mobile payment technology of choice for consumers using mobile phones for retail payment transactions in the United States.

This white paper describes what is necessary to implement and deploy proximity mobile payment systems, discusses the relevant technical and business issues from the perspective of the various stakeholders (e.g., mobile operators, the financial industry, end-users, providers and vendors), and outlines the potential opportunities and barriers that may impact its market adoption.

[27] Federal Reserve Bank of Boston, op. cit.

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2. Implementing Mobile Payments: Meeting Stakeholder Needs

According to CTIA, there are more than 219 million wireless subscribers in the United States.[28] In other words, more than 72 percent of the total U.S. population owns some type of wireless device, such as a mobile phone, wireless email device (such as a BlackBerry®), or PDA. Many people use their mobile phones for more than simply making and receiving calls.[29] The mobile phone is becoming a full-service electronic device, rapidly replacing the address book, appointment diary, camera, MP3 player, portable TV/movie player, and plastic card used for contactless credit and debit transactions.

Today's consumers increasingly value convenience—services or features that they regard as "useful to me." Mobile payment pilot projects and implementations carried on outside of the United States have shown that consumers value the convenience of using their mobile phones for payment at a physical POS. One forecast predicts that mobile-phone-based contactless payments will account for over $36 billion of worldwide consumer spending by 2011,[30] while another indicates that by 2012, some 292 million handsets—just over 20 percent of the global mobile handset market—will ship with built-in NFC capabilities.[31]

Mobile payment transaction models vary. Different implementations use the existing financial credit/debit card payment system, prepaid financial cards and accounts, stored-value payment methods, or payment through mobile operator post-paid accounts. The success of any model will depend on various factors, including consumer acceptance of the approach, the amount of new infrastructure and investment required to implement the system, and the strength of the relationships formed among all of the business stakeholders. Different countries and regions are adopting approaches tailored to their local markets.

Implementation of proximity mobile payment can be complex. Mobile payment requires the deployment of new technology to consumers, merchants, mobile operators, and the financial community. New business partnerships must be formed among mobile operators, financial service providers, and mobile device manufacturers. The new services must be presented to consumers and merchants in a way that drives adoption of the services while enhancing security and usability. Successful implementation must overcome these challenges while delivering benefits to all stakeholders.

2.1 Factors Affecting the Emergence of Mobile Payments

Several factors are driving the mobile payment revolution. First, consumers are adopting wireless data services, including contactless payments, very rapidly. Consumers in Asia already use mobile phones for transit and retail payments. Proximity mobile payment has been implemented in both Japan and South Korea. Within North America, the financial industry is rolling out programs in which contactless payment devices are linked to mobile phones.

Next, mobile hardware is becoming less expensive, faster, and easier to use while incorporating more functions. Mobile phones are a growing presence and are rapidly modifying consumer behavior. According to IDC market research analysts, the worldwide mobile phone market reached a milestone at the end of 2006, with more than 1 billion units shipped worldwide over the year. This represents an increase of 22.5% over 2005.[32]

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[28] CTIA -- The Wireless Association, "Wireless Fact Sheet," September 2006
[29] Federal Reserve Bank of Kansas, payments system research briefing, December 2006
[30] Strategy Analytics, NFC Forum, "Near Field Communication Technology and the Road Ahead," February 14, 2007
[31] ABI Research, "Twenty Percent of Mobile Handsets Will Include Near Field Communication by 2012," April 11, 2007
[32] 3G.co.uk, "Worldwide Mobile Phones Shipments Past One Billion for 4th Quarter," http://www.3g.co.uk/PR/Jan2007/4184.htm

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Previously, the use of phones for applications such as mobile payment was constrained by industrial and technical limitations and by the outdated payment systems available to support such applications. However, the market situation is changing rapidly, due to major programs and investment in contactless technology, new mobile standards (such as NFC), and improved interoperability. Years of development have resulted in standards and user interfaces appropriate for mobile access and contactless payment. Much of the infrastructure is already in place for the next generation of mobile communications, with operators worldwide implementing Global System for Mobile communications (GSM), General Packet Radio Service (GPRS), and Universal Mobile Telecommunications System (UMTS) technology. The ISO/IEC 14443 standard (adopted by the financial industry for contactless credit and debit card payment) together with a new, compatible standard, ISO/IEC 18092 (Near Field Communication), offers a standards-based path for implementing payment and other contactless applications on mobile phones. Although some specifications are still being developed, the standards that support both mobile communications and payment are nearing maturity

Finally, merchants, banks, and service providers understand that mobile or contactless payment initiatives offer business opportunities.

2.2 Consumer Influences

Pilot implementations of mobile payments have shown that consumers find mobile payments to be both functional and convenient. In a March 2007 survey from Visa USA, 57% of respondents that were shown mobile payment technology were interested in purchasing a phone with payment capabilities[33]. While consumers are receptive to innovative mobile payment devices and services, they are also still looking for a strong value proposition.

To take advantage of consumer willingness to use new payment mechanisms, the providers of devices enabled for mobile payment at the physical POS must be able to support mobile transactions that are convenient and easy to use. Consumers are aware that they have alternatives.

Consumers now are also more sensitive to security and privacy issues. Mobile payment scenarios can enhance security and privacy. However, if consumers perceive that mobile payment potentially involves loss of privacy, they will not accept it.

2.3 Key Stakeholders

Proximity mobile payments offer substantial potential benefits to businesses and consumers alike. Implementation will also create new opportunities for partnerships between key stakeholders.

2.3.1 Mobile Operators

According to a Deloitte & Touche report,[34] mobile operators could see significant economic benefits from offering mobile payments. Potential benefits include new customers, reduced customer churn, and revenues from new, payment-related data services (such as text message ads). Benefits will accrue particularly to operators who are “first movers” and use the service to competitive advantage.

One of the challenges mobile phone operators face today is the high churn rate of their subscriber base. Operators seek applications that allow them to provide long-term services for customers. Turning a mobile phone into a viable payment device at the physical POS could permit operators to offer more complex financial or commercial services. Operators could work with financial institutions and retailers to install these services and provide savings and convenience to their subscribers.

Mobile operators recognize that offering additional services can attract new customers and stabilize their subscriber base. With or without a retail or financial partner, mobile operators may be positioned to explore a new business model as a payment provider. Mobile operators are already starting to

[33] Visa USA, Survey based on 800 mobile phone subscribers with debit or credit card.
[34] Deloitte & Touche, "The Case for Using Mobile Phones for Payments,” report, August 2004

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bundle mobile payments with other services. Operators can add “phone purchases” to a monthly statement (as is currently done for digital content), thereby reducing the consumer’s need to use a traditional credit or debit card for purchases. Alternatively, they can partner with a financial institution, taking a fee for every credit or debit “card” loaded on to the operator’s subscriber identity module (SIM) card or other secure element in the mobile phone.

Mobile operators also have an opportunity to obtain revenue from increased network use.

2.3.2 Financial Institutions

Proximity mobile payments allow financial service providers to offer new, differentiated payment services to their customers, increase their credit and debit card transaction volumes, and extend their brands. (Institutions who traditionally lead with innovative new payment products are already doing so.) Payment brands are teaming with mobile device suppliers to incorporate their brands into emerging products.

By leveraging the contactless infrastructure currently being deployed and adding contactless payment to mobile phones, financial institutions can provide their cardholders with the same trusted payment services currently provided by cards. This payment functionality will make it faster and more convenient to pay and increase customer loyalty. In addition, mobile payments will allow financial institutions to further penetrate cash- and check-heavy merchant segments and open new acceptance channels.

Financial institutions will also be able to offer their customers purchase-related services like account management and tracking functions as well as loyalty services, such as instant savings and rewards, easy-to-use, personalized loyalty programs, and e-coupons.

2.3.3 Merchants

Proximity mobile payment implementations that capitalize on the contactless payment infrastructure can offer immediate value to merchants. Numerous implementations worldwide have demonstrated that contactless payment offers immediate benefits in the forms of faster payment transactions and improved customer convenience. Mobile payment can also help merchants establish stronger customer relationships and customer loyalty.

Merchants benefit from operational efficiencies expressed by faster transactions and fewer requirements to handle cash, thus lowering costs and enhancing customer convenience. Merchants, like financial institutions, can offer their customers purchase-related and loyalty services, such as paperless receipts. Merchants can also make their gift card and loyalty programs more effective; customers will always have their “payment cards” in their mobile phones. A merchant’s contactless POS system can then interact with the customer’s payment cards wherever a customer shops.

Merchants can also benefit from branding opportunities, market differentiation, and an opportunity to grow their customer base. Contactless payment systems that reduce infrastructure costs can improve return-on-investment for merchants. Add-on applications such as loyalty programs, e-coupons, and rewards can also enhance the value proposition.

2.3.4 Mobile Handset Manufacturers

Innovative mobile applications represent an opportunity for handset manufacturers to attract new customers and create new business partnerships.

Mobile handset manufacturers can gain a competitive advantage by offering mobile phones that support payment and other mobile applications. Just as early camera phones captured consumer market share, mobile phones that support additional applications can capture new customers and offer new business partnership opportunities.

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2.3.5 Opportunities for Applications Developers

Application developers working with banks and mobile network operators can develop innovative new products. Mobile phones with NFC can offer advanced feature sets; contactless payment can be made from an active device, rather than a passive one such as a card or key fob. The device can have a keyboard and display and be interactive, allowing, for example, additional security features, credit-balance displays or enhanced loyalty programs.

Because a single phone can store several cards, the phone will require an e-wallet and should allow customers to select the correct card easily and accurately. Such new applications will also benefit banks and mobile operators, helping them differentiate their products and enhancing the value propositions they offer consumers.

2.3.6 Opportunities for Third Party/Personalization Bureaus

To implement mobile payment at a POS, a mobile device or handset must be loaded with a payment application. Early pilots required manual personalization of the payment application on the chip in the Motorola and Nokia phones used for the studies. This process was supported by the payment institution's standard issuance model.

However, a manual personalization process is not considered practical for deploying high volumes of products rapidly. Recent proximity mobile payments pilots download a payment application dynamically to the phone's SIM or secure element, using OTA, as required by the consumer. Unlike a standard activation, this process is not under the control of the mobile operator, nor can it be managed by the typical personalization process implemented by financial institutions.

Trusted third parties capable of performing OTA personalization will need to be identified and certified to execute this process. These third parties will have to be acceptable to both the financial institution, whose payment product is being downloaded onto the mobile phone, and the mobile operator, whose product will have to manage the interface between the payment product and the POS.

2.3.7 Opportunities for Consumers

Proximity mobile payment can offer consumers increased convenience, savings, and personalized assistance with their shopping and payment needs. Moreover, a wide range of additional applications can be enabled using contactless technology:

- Paper receipts can be made obsolete. Instead, payment transaction records can be accessible on a consumer's mobile phone.
- Consumers can manage their entire debit, credit, prepaid, gift card, and loyalty card portfolios using their mobile phones.
- Consumers can use their mobile phones for entry through access control points such as the entries to fitness or other members-only clubs.
- Consumers can also receive instant and specialized offers based on their shopping patterns and enjoy benefits provided by retailers and financial institutions based on their profiles and lifestyle choices.

2.4 Implementing Proximity Mobile Payment in the United States

During the last few years, multiple pilot projects have tested the use of mobile phones and PDAs[35] to make payments at physical POS systems. These pilots indicated that consumers are interested in mobile payment. In fact, some of these pilots turned into commercial roll-outs – for example, NTT DoCoMo[36] and KDDI[37] in Japan.

[35] CR80 News, "Santa Clara Puts Payment in Palm of your Hand," May 2003
[36] NTT Docomo, "NTT Trials Contactless Payments," December 2004

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In 2005, the launch of contactless financial payments across North America began in earnest. Leading banks have issued millions of contactless credit and debit cards to consumers, and leading retailers have installed contactless readers that can accept contactless payment and are integrated with POS systems. The rate of deployment of contactless infrastructure is the highest ever observed for emerging payments products and technology.[38]

The ubiquity of POS terminals that accept standard credit/debit cards combined with the success of the secure contactless payment programs introduced by American Express, Discover® Network, MasterCard, and Visa, and their acceptance by consumers, has motivated an increasing number of merchants to install contactless POS terminals that can also communicate with NFC-enabled phones. To date, more than 55,000 merchant locations[39] are enabled for contactless payment worldwide, the majority of which are in North America. Contactless payment has been adopted in a wide variety of merchant segments and has opened opportunities to use contactless credit and debit products at new acceptance locations, such as in mass transit systems, with vending machines and at unattended kiosks.

NFC technology is expected to enable an even larger group of applications for mobile phones. These applications are expected to help drive acceptance of mobile services, which in turn could increase both the market penetration of NFC-enabled mobile phones and their use for payment.

A growing number of mobile payment pilot projects or implementations are taking place in the United States. The move to contactless payment by the U.S. financial payment industry creates an opportunity for almost immediate implementation of mobile payment.

2.5 Proximity Mobile Payment Implementation Scenario

The expected increase of NFC-enabled phones makes implementation of proximity mobile payment possible. This section describes an example scenario for implementing proximity mobile payment leveraging NFC-enabled phones and the contactless financial payment infrastructure.

To encourage wide use of the NFC phone as a payment device, multiple payment cards could be supported by the mobile phones currently being developed and tested by handset manufacturers. Consumers can then carry their choice of payment cards on the NFC phone and choose a payment option at the time of purchase, just as they do today using a physical wallet or purse and plastic cards.

The payment cards present on an NFC phone can be thought of as “soft cards." They reside on the phone in electronic form and are managed by a secure wallet software program. The wallet software may display images of the soft cards that incorporate the card issuer’s branded look and feel, as on a plastic card. The program can display these images at the time of a purchase. Consumers choose a payment card by selecting an image.

Financial information, such as an account number and expiration date, is stored in a secured memory area in the NFC phone. This memory could be provided either by a secure smart card chip similar to the one used for contactless payment cards (currently implemented in most of the NFC-enabled mobile phone pilots), in the memory of the SIM chip (which is used by GSM mobile phone operators to authenticate subscribers on their network and maintain personalized subscriber information and applications) or in another secure element in the mobile phone. Vendors are currently offering SIMs with additional cryptographic capability that allows for secure storage not only of financial data, but also of the branded contactless payment applications being supported by the financial industry.

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[37] Finextra, “KDDI to add FeliCa contactless card technology to mobile handsets,” September 30, 2004

[38] American Express, MasterCard, and Visa have implemented new programs and rules that apply to low value transactions in specific industries. The programs waive the requirement for a signature for participating merchants when the transaction value is below a certain amount (typically $25, though this varies by payment brand). The merchant generally has full chargeback protection for transactions that meet the requirements of these programs.

[39] MasterCard, op. cit.

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Consumers could request that soft cards be issued OTA by clicking a few buttons on their NFC phones and identifying themselves to the issuers as the correct cardholder. Enhanced OTA management capabilities could enable issuers to activate cards or cancel lost, stolen, or over-limit cards.

To facilitate OTA issuance, mobile phone operators will need to work with major financial payment card issuers to develop a consumer activation process. The OTA infrastructure currently deployed by mobile operators can support OTA activation of soft cards. However, inter-network communication and security protocols must be standardized, and the card issuers and operators must develop a business model that benefits all participants in the payment transaction.

Upcoming pilots are testing several different personalization and issuance models. Regardless of the model, it is expected that all stakeholders could see multiple benefits from the deployment of remote mobile payment using soft cards. These benefits are discussed further in the following sections.

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3. Financial Industry Needs

Mobile operators are looking for new revenue sources to boost their average revenue per user (ARPU) and are not accustomed to sharing their customers with other entities. The competition between mobile operators and banks has been largely hidden, however, because mobile services have been slow to catch on.

Proximity mobile payment has made this competition visible. Proximity mobile payment will allow subscribers to use a growing contactless POS infrastructure. With NFC phones, mobile operators, banks, and other players can offer more services related to payment, like mobile banking or downloadable coupons.

Banks are positioned today as the consumer's most trusted provider of financial services. This will motivate banks to enter this market in a way that provides new services to the consumer and offers the banking customer a choice of mobile payment solutions.

3.1 Business Model Requirements

A viable proximity mobile payments offering will require full cooperation and partnership between banks and mobile operators. Some business models do not encourage such cooperation. Business models must be developed to deliver value to all stakeholders.

Banks have traditionally owned the payment space. Some proximity mobile payment models encourage mobile operators and other third parties to stake claims to that space. The fee structure in place today for traditional payments dictates the revenue and expense sharing arrangements among merchants, acquirers, issuers, networks, and sometimes other parties. Without an increase in volume (if you simply execute the same transaction with an NFC-enabled phone), there may be no incremental revenue, but there are new parties to the transaction. Existing stakeholders (including banks) need a compelling reason to share these revenues. At the same time, the benefits that proximity mobile payments accrue to the mobile operators, merchants, and other parties must be considered when developing business models.

In addition, certain models can increase bank costs. Although the process of putting a payment service in the hands of the consumer can be fast—it is a matter of minutes to register and download an application over the network to a phone—the process also introduces new components (i.e., OTA) that increase the cost of the standard payment device. There are significant operational and risk management implications to these processes. Activities related to customer service, device tracking, application management, and key management (among others) may increase issuer costs.

Another issue has been the availability of NFC-enabled phones in the U.S. While an increasing number of NFC-enabled phones are becoming available, consumers will want a choice of 3G/4G handsets that can support proximity mobile payments.

Other considerations for banks when deciding whether to deploy proximity mobile payment include who will control downloads of the payment applications to the phones and where those applications will reside. Banks may be cautious about an environment in which they neither own nor control the distribution of the payment form factor, as they do today. Some banks may be uncomfortable putting applications on the SIM card. For one thing, the SIM has yet to be certified (outside of demos) by the financial payment brands to run a payment application securely. More important, banks want to maintain their relationship with the customer as a trusted provider of financial services.

3.2 Market Opportunity Requirements

To determine whether a new offering represents a market opportunity, financial institutions should consider projected market size, the maturity and complexity of the offering, and the number of stakeholder relationships that the institutions will be required to manage. Financial institutions should

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also consider the mobile payments strategy within the context of the larger retail banking and retail credit/payments strategy. Figure 4 shows the relationship between implementation complexity and the relative size of the market for mobile payments applications.[40] As illustrated in this figure, proximity mobile payments and marketing (including service discovery and coupons) are expected to be by far the largest markets. However, these two offerings are the most complex and the least mature, and they involve the greatest amount of stakeholder cooperation.

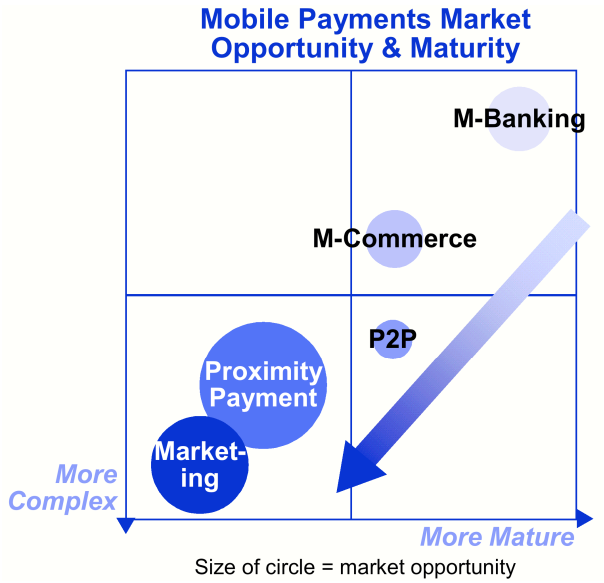

Figure 4: Mobile Payments Market Opportunity and Maturity

Financial institutions should also consider the mobile payments strategy within the context of the larger retail banking and retail credit/payments strategy. They may wish to evolve their mobile offerings, starting, for example, with mobile banking. Table 1 describes the different possible mobile financial service offerings that could be considered for implementation.

Table 1: Overview of Mobile Financial Service Offerings

Category	How It Works
Mobile banking information	Delivers mobile account and transaction history
Mobile banking transactions	Enables mobile transfers, bill payments, actionable alerts
Remote mobile payment	Enables P2P remittance—transfers money using a mobile phone M-Commerce—uses mobile phones for e-commerce purchases
Service enhancements	Uses mobile phones as authentication devices to improve speed and security Orders/payments may come through other channels
Proximity mobile payment	Uses mobile phones as integrated proximity payment devices at POS
Marketing	Leverages transaction data to deliver targeted “offers” and a complete feedback loop

[40] John Suchanec, CardTech SecurTech, May 2007

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3.3 Mobile Financial Service Strategy

Financial institutions are moving to create their strategy to support mobile financial services. Pilots, trials, and proofs-of-concept will create a market perception of proximity mobile payments as a viable solution and provide useful information about customer preferences and ease-of-use. However, financial institutions will also need to formulate long-term strategies and build partnerships with other stakeholders.

Proximity mobile payment represents one part of a strategy that many major banks and financial institutions are pursuing. The strategy includes marketing, information, and payment services.

Banks, card issuers and payment brands will need to move deliberately to test new products and identify a method for provisioning, personalization, and interoperability. These entities will need to conduct a significant amount of product testing to determine the combination of features and usability that will entice consumers to use a new product. They should take maximum advantage of each proof-of-concept, pilot, and limited rollout as an opportunity to understand the relative strengths and weaknesses of each approach and to learn what consumers like and don't like.

Banks, card issuers and payment brands may leverage their traditional "champion-challenger" stage-gate product testing processes to test proximity mobile payments and obtain customer insights. Product testing "floats" a new idea to a consumer and compares it to all ideas in the product queue. In the case of proximity mobile payments, such testing compares the speed and convenience of using such payments to using cash.

Surveys and focus groups can help banks understand factors such as the likelihood of product acquisition, the desirable form factor, and any concerns raised by the new payment type (such as security, fraud, or theft). The surveys can be conducted among test populations such as bank employees or populations in controlled environments such as university campuses. To determine preferences and performance, these trials should include the following:

- Indicators that identify the type of payment used (card, fob, phone).
- Trial merchants, including cafeterias, vending machines, and retailers at work locations, and convenience stores, drugstores, quick-service restaurants, theaters, and sports venues outside of work locations.
- Means of testing the effectiveness of various components of a marketing program, including introductory pieces, follow-up mailers, news articles, promotional give-aways at work, banners, and signs.
- Ability to gather data to support testing of hypotheses about the following:
  - "Opting-in" to form factors in addition to cards.
  - Customer experience with personalization, payment, and security features.

Some banks are already conducting surveys of their employees to test acceptance and to determine the following:

- Preferences for a particular form factor (cards, mobile phone, fob).
- Ease of acquiring the device, ease of activation, and impact on usage and spend.
- Appeal of service discovery applications.
- Preferences for a personalization process (personalized package or dynamic personalization using OTA).

3.4 Tipping Points

To determine the best strategy, it is important for banks to measure the readiness of the market for mobile payments. Some key metrics could be:

- The percent of transactions that are contactless in a specific geographic area

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- The percent of locations in key merchant segments that have deployed contactless payment readers
- Announcements by major carriers about the incorporation of NFC chips into new mobile phones
- Implementation of a standard wallet product by a key industry stakeholder
- Implementation of secure and trusted provisioning services.

Table 2 suggests metrics that can be used to assess tipping points for mobile payments market readiness, at which time banks and financial institutions may be more likely commit to deployment of proximity mobile payments as a part of the larger mobile services strategy.

Table 2: Potential Metrics for Financial Institutions to Consider in Developing a Proximity Mobile Payments Strategy

Metric	Rationale
Percent of total transactions in a major test area that are contactless transactions	Demonstrates the value proposition
Percent of retail locations in key segments (e.g., fuel, grocery, quick-service restaurants, and pharmacy) with contactless readers	Identifies priority merchant segments
Announcements by major carriers that they will install NFC chips in most G3–G4 mobile phones	Establishes size of mobile subscriber market having access to NFC-enabled phones and being able to take advantage of proximity mobile payments
Implementation of standard, generic proximity mobile payment wallet by major bank or significant non-bank provider	Indicates stakeholder and infrastructure readiness for deployment
Implementation of secure and trusted provisioning services by major industry players	Indicates that industry stakeholders believe mobile payments have a future and are investing in the technology

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4. Mobile Operator Needs and Roles

Mobile operators play a vital role in making proximity mobile payments happen. Without operator acceptance, NFC-enabled mobile phones will not become widely available. In the United States, operators have significant control over what mobile phones are available in the marketplace. They typically dictate the hardware and software architecture and feature sets to the handset manufacturers. They are also responsible for certifying and loading applications on the phones. While the level to which the applications are controlled varies by operator, control can be very strict.

Although operators have recognized the potential benefits and uses of NFC-enabled phones for the past few years, translating use cases into positive business cases has proven to be more difficult. Recently, however, field trials have produced overwhelmingly positive user feedback about ease of use and desire to use proximity mobile payment features. Positive user experiences will result in increased customer loyalty. The expectation is that proximity mobile payments will make users' mobile phones even more important to them and reduce the likelihood that they will discontinue or change their service. Reduced customer churn has a major effect on a mobile operator's revenue stream. As a result, mobile operators represent another stakeholder deriving benefits from a mobile payment offering. Analogous to asking banks to share transactions revenues, carriers might be expected to share revenues that they accrue by offering mobile payments. In addition to shared revenue models, stakeholders may need to share costs based on the associated liability of a mobile payment transaction, including fraud and increased customer service.

As a result of these trials, leading operators are commercializing trial services in 2007 and 2008. In addition, 20 of the largest mobile operators in the world have been working together in the GSM Association (GSMA) to develop a common vision for mobile NFC architecture and services. The initiative began in 2006, and white papers that convey the GSMA viewpoint are being issued throughout 2007.[41]

4.1 Business Case

Proximity mobile payment is only one element in the business case for NFC-enabled mobile phones. Mobile operators expect to derive value from other uses of an NFC-enabled handset.

4.1.1 Additional Factors

NFC allows the mobile phone to serve as a contactless card (e.g., for payment, transportation, and event ticketing). NFC also enables the phone to serve as an RF reader (for example, the phone can read information from RF tags embedded in smart posters or other smart objects). Finally, NFC allows the phone to exchange information peer-to-peer. Two phones can exchange contact information by being touched together, or a Bluetooth, WiFi, or WUSB connection can be initialized by bringing the two devices together. These three uses together make a truly compelling case for operators to require NFC in their future handsets.

Applications enabled by RF reader and peer-to-peer functionality can produce revenue for mobile operators by increasing data traffic on their networks (for example, touch a smart poster and automatically connect to a URL). Additional revenue can be produced by using this scenario to simplify the purchasing process for operator-targeted content and services such as ring tones, wallpaper, and games. Peer-to-peer functionality can be leveraged to create new social networking services and increase the number of people using services that are already available. The NFC-enabled handset simplifies the user experience enough that mainstream users are able to access services that today it is too complicated for them to access.

[41] GSMA, "Mobile NFC Technical Guidelines," April 2007

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4.1.2 Proximity Mobile Payments

The most complex portion of the mobile operator business case is the portion dealing with proximity mobile payments. A number of stakeholders with complicated relationships are involved, and the legacy system for cards is well established.

Proximity mobile payment systems require the convergence of two distinct worlds—mobile operators and financial institutions. A number of business models between mobile operators and banks are being discussed. These multi-party negotiations are challenging. Each mobile operator must negotiate with several banks and vice-versa. These negotiations can have an impact on time-to-market. In the initial stages of proximity mobile payment market development, market differentiation and time-to-market may both be key elements of mobile operators' strategies. Therefore, various mobile operators may be reluctant to come together to identify a converged, common business model approach with the financial industry. In the longer term, a converged approach would strengthen the ecosystem and help to proliferate mobile payment services.

One possible business model mirrors the landlord–tenant relationship. The operator controls the secure element inside the phone and acts as the landlord. The bank pays the operator to let the bank's service reside in the secure element (the bank is the tenant). The operator could load and delete the bank's specific payment applet, but the operator could not access the applet itself. Operators could rent "rooms" to different banks and evict the banks if necessary, but they could not go into the rooms or control how each bank lives within its room. The landlord fees for different operator-bank relationships could be different. Some banks might pay a one-time fee to get into the secure element. Others might pay recurring fees or fees based on the number of transactions. How this model is put into place will be the result of negotiations between specific mobile operators and specific banks.

Other business models are also being discussed. One calls for subsidies to be paid for customer acquisition. For example, a customer purchases an NFC-enabled mobile phone for $200. If the customer signs up for a particular bank's credit card, the customer can buy the phone for $100 or receive it free. In this case, the bank pays the operator for the customer acquisition. The reverse scenario is also possible. A customer can open a bank account with an increased interest rate or a reduced minimum monthly balance or acquire a credit card for which the annual fee is waived or the interest rate reduced if the customer also signs up for a new 2-year mobile phone contract. Now the operator pays the bank for the customer acquisition.

Lastly, the incorporation of a single integrated mobile wallet that enables a consumer to add any payment card from any financial institution desired may provide the foundation for an additional revenue source. For example, with this model, the operator may be able to generate advertising revenue through the impressions presented to the consumer when using such a wallet.

Whether only proximity mobile payments will be deployed or other uses will also be deployed simultaneously will vary from operator to operator. In any case, mobile operators and banks will only cooperate on the deployment of mobile payment technologies when they see a winning business case that delivers immediate returns for each of them. They may not launch a service with only hopes for future revenues. Mobile operators want implementations to have an immediate positive effect on their bottom lines.

4.2 Role of the Operator in Proximity Mobile Payments

Mobile operators are critical to the success or failure of a proximity mobile payment system. They not only sell users NFC-enabled phones, they play a crucial role in how the user experiences this new service.

4.2.1 Role in Card Management

Most operators want the user to have a unified experience across various handset makers. To accomplish this, many are expected to offer operator-specific mobile wallets. The wallet will be the

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primary user interface for users wishing to use their phones to make purchases with credit, debit, or prepaid cards or another token such as a transit card or event ticket. The wallet is meant to function similarly to a leather wallet. Users will carry multiple cards in their wallet and have the freedom to choose which card they use and when. The user can also identify one card as a default card.

Since the operator controls the mobile phone and the security domain within the mobile phone, operators will ultimately control which virtual cards reside in the wallet. This means they will also play a role in the process by which cards are initially provisioned and personalized, updated with new information, and eventually removed from the phone.

4.2.2 Role in Provisioning Cards

Provisioning cards in a mobile phone environment presents new challenges. One major challenge is that there are hundreds of mobile phone form factors. Sending cards through a defined manufacturing process is not feasible. Another challenge is that in most cases, a card in a phone will not be personalized until after the phone is in the user's hands. Currently, cards are personalized when they are issued and the user simply calls a number to activate the card.

These two issues have resulted in the development of OTA provisioning and personalization services. These services provision consumer applications to a consumer's NFC-enabled device. The applications can be credit, debit, or prepaid payment cards. They can also be transportation cards or event tickets.

OTA provisioning services introduce the need for a trusted services manager (TSM). The main role of the TSM will be to aggregate the applications from different service providers and perform card management and OTA provisioning to the secure element of the handset. In some cases, the mobile operator will act as the TSM. In other cases, the TSM will be a trusted third party.

4.2.3 Secure Element Selection

Mobile operators, in conjunction with financial institutions, will play a joint role in the selection of the element to be used as the secure element in the phone.

There are three primary options being discussed for placement of the secure element in an NFC-enabled handset, as illustrated in Figure 5.

4.2.3.1 Secure Element Embedded in the Handset

The secure element can be a secure microcontroller embedded in the handset (either mounted on the motherboard directly or connected in some way to the motherboard). This is the architecture that has been most widely tested in mobile payments field trials around the world. The advantage of this approach is that the secure elements that can be embedded today have all the necessary banking hardware and software certifications. One concern facing this option is how to manage the replacement of the handset when the subscriber wants to change their phone. The transfer of payment credentials could be managed OTA in the same way that the secure element is initialized. This provides another service revenue opportunity for the operator and/or the trusted service manager.

4.2.3.2 Memory Card as the Secure Element

With this solution, an external memory card (e.g., a miniSD card) hosts a secure chip with a microcontroller and flash memory. This solution could allow any party to provide "memory" cards with their applications.

4.2.3.3 SIM Card as the Secure Element

With this architecture, the SIM card hosts the payment applications as well as other NFC applications. The applications can be stored in the SIM component itself or as an additional component in the SIM plug.

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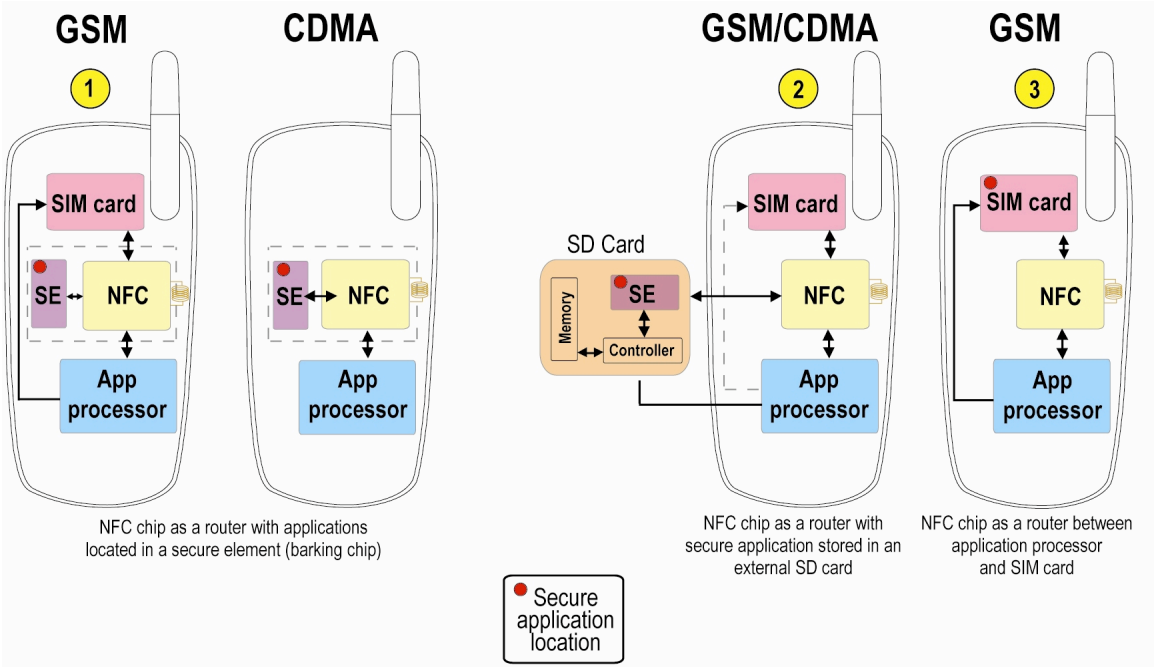
Figure 5: NFC Secure Element Options



4.2.3.4 Standardization Status

GlobalPlatform is working today on defining how to initialize and manage separate secure elements to the SIM in a mobile phone so that the industry can rely on a trusted way of managing these new architectures. This work is not related to the specific physical location of the secure element which can be co-located in the SIM or placed as a separate element in the phone. The architecture is being designed so that it can be leveraged by both GSM and CDMA architectures.

ETSI and the NFC Forum are working on the Host Control Interface (HCI) software that will operate the NFC chips.

GSMA is recommending a link between the SIM and the NFC chip in the phone. The standard that seems to be emerging for this connection is SWP (Single Wire Protocol).

4.2.3.5 Advantages and Disadvantages of these Architectures

The separate secure element architecture (described in 4.2.3.1) will allow a common architecture for content providers independent of the mobile phone technology – GSM or CDMA. This may play a role in the choice of these architectures in the future. It is an advantage for content providers not to have to worry if their customers have GSM or CDMA providers in countries where CDMA is still strong (as in the United States). This architecture can leverage existing certifications for secure elements.

The memory card approach (described in 4.2.3.2) is still looking for a business driver to answer the question of who pays for the memory.

The SIM-centric architecture (described in 4.2.3.3) provides mobility for the consumer financial credentials, which is a strong consumer advantage. The certification cycles of the SIM card and the banking secure elements are very different and may become a hurdle to the adoption of this architecture. The issue will be related to the cost of banking certification and the compromise to SIM flexibility that the carrier will have to manage. Some large trials or soft launches using this architecture are being run in Europe or about to be launched in Asia.

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Hybrid architectures for GSM may also emerge, where applications with lower certification requirements may migrate into the USIM (e.g., MIFARE® or Felica™ for transportation and closed payment schemes). However, it is anticipated that banking applications would remain on a separate secure element located either within the USIM packaging or within the phone.

In addition, a convergence of functions into single chips like secure elements and NFC chip combinations may occur to reduce the cost and real estate requirement in the phone.

4.3 Requirement for Interoperability and Backward Compatibility

Complete interoperability among different handsets and different mobile operators and backward compatibility to the existing contactless payments infrastructure are critical requirements for successful deployment of proximity mobile payment technology and services. If users have to learn a completely new method for making payments each time they change operators or handsets, the entire value proposition will break down.

The NFC Forum is outlining specifications that will ensure these requirements are met. The requirement is also recognized by mobile operators. The GSMA is issuing guidelines in their white papers that emphasize interoperability and backward compatibility, and are intended to eliminate fragmentation.

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5. Merchant Needs

The move to contactless payment by the financial payments industry is creating an opportunity for virtually immediate implementation of proximity mobile payment. As of May 2007, more than 55,000 merchant locations worldwide are enabled to accept contactless payments, including McDonald's, 7-Eleven, CVS/pharmacies, Regal movie theaters, Arby's, and Jack in the Box. All of these locations are equally capable of accepting payments from NFC-enabled mobile phones.

In the next 3 years, hundreds of thousands of merchants in the United States should be enabled to accept payments from NFC-enabled mobile phones and other devices. Contactless payment is being implemented successfully in a wide variety of merchant segments including quick service restaurants, convenience stores, sports arenas, entertainment venues, pharmacies, gasoline stations, vending machines, taxis, and parking lots, as well as in other retail chains and small mom-and-pop stores.

An even larger group of applications for mobile phones is expected to be enabled by NFC technology. These applications can drive acceptance of mobile services, which in turn could increase use of mobile phones for payment.

Merchants play a critical role in making proximity mobile payments a reality. Success of proximity mobile payments depends directly on the number and diversity of merchant locations at which customers can use mobile phones for contactless payment. And as more of the merchant locations at which consumers usually shop offer contactless payment, more customers will pay using contactless payment devices (such as mobile phones) than traditional magnetic stripe cards.

Merchants have specific needs for the technology deployed in their locations. If those needs are met, however, merchants may realize a number of benefits from accepting payments from mobile phones.

5.1 Dependability

Dependability is a primary concern for merchants. Understandably, the last thing a merchant needs is for any payment acceptance technology to not function as required.

Mobile payments leverage the magnetic stripe technology that has been in use for years and the contactless payment technology that has been deployed for at least 3 years. In addition, since proximity mobile payment does not require merchants to replace the existing payment infrastructure, merchants and customers can still use traditional magnetic stripe or contactless cards if necessary.

5.2 User Friendliness

Merchants want technology that their customers and employees can use intuitively. In addition, merchants do not want to add to their employee training needs.

With the current rollout of contactless payments, clerks are learning how to accept payments using contactless technology. This knowledge is likely to carry over to mobile payments. In addition, U.S. customers are becoming increasingly comfortable with using their mobile phones for more than just making phone calls.

5.3 Faster Transaction Times

Both merchants and customers want fast transaction times, to shorten the payment process. Some merchant segments – transit, for example – require specific fast transaction times in order to meet their customer throughput needs. Chase has reported that contactless payments reduce customer time at the POS by 30-40%[42]. An American Express study found that contactless transactions are 63% faster

[42] Chase, Blink Fact Sheet, http://www.chaseblink.com

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than cash transactions, and 53% faster than traditional credit card transactions.[43] Significant time savings are realized in the drive-through and quick-service restaurant environment, where MasterCard reports up to 40% reduction in wait time.[44] Since mobile payments will leverage the contactless payments acceptance infrastructure, merchants should realize similar reductions in transaction time.

5.4 Increased Revenue

Increased revenue is critical to a merchant's growth. Multiple variables have an effect on a merchant's revenue stream:

- Ticket size
- Number of transactions
- Wallet share of the merchant's own cards
- Customer loyalty

Contactless transactions appear to increase both ticket size and number of customer transactions at a particular merchant. MasterCard has reported that the average ticket size increases up to 40% when customers use PayPass.[45]

Proximity mobile payment solutions should enable merchants to enjoy better wallet share. Not only will merchants be able to accept branded credit, debit, or prepaid card payments at their stores, they will also be able to enhance their own private label, gift card, and prepaid card programs. Consumers will always carry a merchant's payment cards in their phones; there will be no chance that consumers have left their merchant cards at home.

Merchants value technology that helps them build customer loyalty. Proximity mobile payments offer merchants opportunities to increase differentiation and customer satisfaction in highly competitive retail markets. Merchants will be able to drive personalized and location-based promotions, coupons, and loyalty programs for their customers. For example, merchants can provision promotions or coupons OTA into their customers' mobile phones for use electronically at the merchant's POS system.

5.5 Reduced Expenses

All merchants are concerned with the bottom line and seek ways to control capital and operational expenses. Proximity mobile payments can affect these expenses in a variety of ways:

- *Cost of deployment*. As the number of locations that accept contactless payments increase, volume-based efficiencies will drive down the cost of contactless acceptance technology. Declining costs make it easier for merchants to attain a justifiable return on Investment.
- *Cost of downtime*. Contactless acceptance technology has improved significantly, due in part to feedback from pilot projects and tests. These improvements have improved payment terminal reliability and lowered the tangible and intangible costs of terminal downtime.
- *Cash handling expenses*. Hidden costs such as breakage, fraud, theft, and transaction time make cash perhaps the most expensive form of payment for a merchant. Proximity mobile payments reduce cash handling expenses.
- *Operational expenses*. Proximity mobile payments streamline the payment process and eliminate some bureaucratic processes. For example, mobile phones can allow merchants to replace paper coupons with digital coupons. The electronic exchange of

[43] RFID Journal, "AmEx Adds RFID to Blue Credit Cards," June 7, 2005
[44] MasterCard, Cathleen Conforti presentation at CardTech SecurTech, May 2007
[45] Ibid.

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coupons and transaction data will improve operational efficiencies and reduce operating costs.

5.6 Minimal Infrastructure Changes

Merchants do not like to make infrastructure changes to their physical POS systems. If changes are required, merchants need them to be easy, involving minimal downtime. Implementing mobile payment at the POS is a multi-faceted process, requiring the deployment of contactless technology to merchants, periodic training of sales clerks, and education of consumers.

Merchants can enable their stores to accept contactless or NFC-enabled phone payments using readily available and standardized software. Adding a contactless reader/writer or a contactless-enabled terminal to the existing POS system and making minor software changes are cost effective to enable acceptance of proximity mobile payments. Various contactless POS solutions available in the market are designed to meet specific merchant requirements for in-store, drive through, pay-at-the-table, and unattended environments.

The Smart Card Alliance white paper, "Accepting Contactless Payments: A Merchant Guide," offers practical guidance and best practices for accepting contactless payments. The guide is available at http://www.smartcardalliance.org.

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6. Acquirers, Processors, ISOs and POS Vendor Needs

Acquirers, processors, ISOs (independent sales organizations that sell equipment and services to merchants), and POS vendors also benefit from the deployment of proximity mobile payment.

Acquirers and processors have a huge stake in the contactless marketplace. Acquirers need the volumes generated by contactless transactions and may lose business if merchants are successful in diverting transactions elsewhere. ISOs may gain revenues by placing contactless equipment in their traditional mom-and-pop marketplaces.

Smaller merchants who want to accept contactless payments can do so by plugging external readers into their POS terminals and upgrading the terminal software. As an alternative, the merchant can upgrade the POS device to a newer model that supports contactless payment. The latter solution allows the ISO to generate incremental revenue from a terminal upgrade. Those ISOs with successful loyalty programs can also profit by upgrading the merchants' programs to issue proprietary loyalty and prepaid contactless devices.

Using a contactless device for payment is the first significant change to the payments industry that provides value to the consumer. The adoption of contactless payments is being driven by cardholders, similar to the pay-at-the-pump phenomenon. Consumers may eventually shop only at locations that accept contactless payments. ISOs, merchants, and processors should embrace this new technology and reap the benefits of increased revenue sooner, rather than later.

There is also a great opportunity for POS vendors to grow their business by adding contactless and NFC mobile payment acceptance capabilities to new models of POS systems. Selling these higher functionality models will present POS vendors with a higher revenue opportunity. Offering these models will also motivate merchants to replace aging POS systems with the new breed of POS systems. Multiple POS vendors have started to recognize this opportunity and have developed multiple POS models with contactless and NFC capabilities.

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7. Consumer Needs

In 2006, the AP-AOL-Pew Research Center conducted a mobile lifestyle survey.[46] The results indicated that U.S. mobile phone users find themselves increasingly addicted to using their mobile phones. In fact, 29 percent said they could not live without their mobile phones. The respondents to the survey also said that they were growing more savvy and confident in using the variety of services and features on their phones, including mobile messaging, mapping, and search features.

Growth in the use of mobile devices to make contactless payments depends on the willingness of consumers to adopt the technology. Mobile payments capability is a logical addition to the suite of services already available on a mobile phone. However, consumers have choices regarding the technology that they use to perform transactions with their mobile devices. There are alternatives to NFC, such as infrared (IR) and secure SMS. Consumers will choose to pay using a particular contactless device only if the device offers real advantages over other technologies and is at least as easy to obtain and use.

Consumers are attracted to products that offer both speed and convenience. Proximity mobile payment does just that. The difference in transaction time between a magnetic stripe and a contactless transaction would probably not drive a consumer to pay with a mobile phone. But contactless payment deployment has been pitched to merchants as a way to replace small cash transactions. Consumers will welcome freedom from fumbling for cash or dealing with rejected paper bills.

Consumers want as close to an “out of the box” solution as possible. When home computers were first introduced, installation and setup could be extremely complex, not easily performed by the average consumer. Today, it has become very easy to set up a home PC. Adding a payment account to a mobile phone will have to be painless; the process of bringing the phone to a “ready state” to perform the transaction will have to be quick and completed with as few keystrokes as possible. Consumers will also expect to be able to easily transfer their information to a new or replacement phone. The development of and recent improvements in OTA personalization of mobile phones with account information is a major step in making this happen and providing a reliable method for downloading personalization information.

Consumers want choices in handsets. They view NFC as another feature on the phone or PDA, like an MP3 player, camera, or Bluetooth capability.

Consumers also expect their cardholder and transaction information to be completely secure. Consumers trust their financial institutions and the mobile carriers with whom they have accounts to safeguard their data. They will not embrace the technology if they have any reason to suspect that this is not the case. The best way for financial institutions to deal with this issue is through consumer education. Just as they provide education on ATM safety and fraud issues such as phishing and identity theft, they will have to take a proactive approach to educating the consumer on mobile phone safety. The zero liability policies adopted by the payment brands and government regulation protect consumers against payment fraud. This is not true of unauthorized usage of mobile phone minutes when a phone is lost or stolen. There is actually a greater exposure to liability from fraud from unauthorized mobile phone usage, yet consumers have not abandoned mobile phones because they fear this risk.

Consumers need places to make proximity mobile payments. An NFC-enabled mobile payments device is of little use to a consumer if it is not easy to find a place to use it. As the number of merchant locations grow, so will the use of mobile phones and other mobile devices to perform payment transactions.

And finally, there is the “coolness” factor. Consumers, particularly young consumers, think paying by simply tapping or waving a mobile phone at a reader is a very cool way to pay.

[46] AP-AOL-Pew Research Center, "Top Trends in Mobile Communications," mobile lifestyle survey (http://mobile1.aol.com/survey)

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8. Business Case Challenges for Proximity Mobile Payments

Mobile payments implementations are still in their infancy, with business models still being defined and tested through numerous pilots in the market. The business case for proximity mobile payments is complicated. There are, of course, the typical concerns about the rate at which both consumers and merchants will adopt a new payment type. However, the fundamental barrier to widespread adoption of proximity mobile payments is the requirement that multiple players cooperate. Many of these players claim both a relationship with the customer and a share of transaction revenue. Any new business model this complex faces considerable challenges.

During the next several years, thousands more merchants in the United States are expected to be able to accept contactless payments. However, certain critical requirements must be met by all stakeholders before high volumes of consumers can actually start using mobile phones for payment at a physical POS.

8.1 Stakeholders

As illustrated in Figure 5, there are a wide variety of stakeholders in a proximity mobile payments system. Depending on the implementation scenario, stakeholders will change and additional stakeholders with varying degrees of involvement may also be involved.

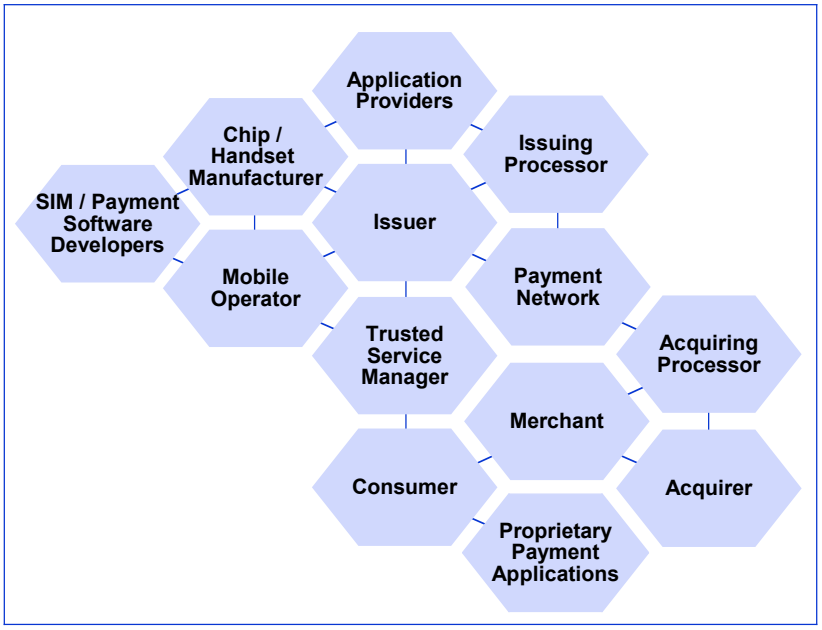

Figure 5: Proximity Mobile Payments Stakeholders

Stakeholders may include:

- **Consumers**, who use the contactless mobile payment devices
- **Issuers**, who issue mobile payment capabilities and support easy management of proximity mobile payments
- **Merchants**, who accept contactless payments
- **Acquirers**, who support merchant acceptance of contactless payments

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- **Mobile operators**, who ensure a supply of mobile phones with NFC technology and support payment services on their networks
- **Payment networks**, who set standards and promote acceptance by all parties throughout the network
- **Chip and handset manufacturers**, who support branded financial applications
- **SIM/payment software developers**, who support branded financial applications
- **Trusted service manager,** including OTA personalization bureaus who provision the payment application to the memory of the phone
- **Issuing and acquiring payment processors**, who process payments acting on behalf of acquiring and issuing banks and who are involved in almost every case
- **Proprietary payment application providers**, who offer payment applications for specific services (for example, transit agencies' fare payment systems).
- **Specialty application provider**, who can add additional value to proximity mobile payments (e.g., PayPal enabling person-to-person payments)

8.2 Definition of a Business Model

A variety of questions must be answered to define a business model:

- **How do stakeholders share the customer?** This is an essential question for issuing banks and mobile operators, both of whom have relationships with the same customers today.
- **Is the business model bank- or mobile-operator-centric?** Some connected with the financial services industry suggest that only a bank-centric model makes sense. But in alternative models, purchases appear on a consumer's telephone bill; however, with NFC-enabled proximity mobile payments, these alternative models would still require that the mobile operator work with the current financial payment acquiring infrastructure.
- **How can ubiquitous consumer choice work?** Early pilots involved a single mobile operator and a single bank card. In the future, consumers will demand choices of payment providers, handsets, and mobile operators. A bank- or mobile-operator-centric model would appear to limit consumer choice, while models that rely on the payment networks setting security and interoperability standards will enable choice.
- **Who runs the operation?** To answer this question, stakeholders must decide who loads the application on the chip and handles personalization, and who selects and manages the applications on the chip.
- **What are possible revenue models for banks and mobile operators?** Both banks and mobile operators need to see revenue benefits from deploying proximity mobile payments. The debate over the revenue model is a source of discussion and negotiation among stakeholders. Two example models are the "pay-as-you-go" model and the so-called "landlord-tenant" model. It is useful to consider real-world analogies to determine an appropriate model. In a pay-as-you-go model, the bank would pay for personalization and provisioning, just as it currently does when it issues plastic cards. A landlord-tenant model, analogous to a bank branch with secure vault, might require banks to pay an annual fee for reserving space on an NFC chip.
- **How are risks and other liabilities accounted for?** Banks have traditionally served in the role as "trusted agent" in delivering financial services. Mobile devices offer to banks yet another channel to deliver such services to consumers. It would appear likely then that banks will continue to take on the financial liabilities associated with the services they offer via mobile phones (i.e., credit risk for contactless credit or debit payments made with an NFC-enabled phone) and will be able to charge for such services accordingly.

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However, banks rely on secure back-end processes and trusted service providers to deliver their services. Mobile operators and other services providers in the mobile ecosystem must be able to certify and, to a certain extent, “guarantee” secured services that protect the privacy of consumers and their financial information. Operators and service providers may need to be able to take on any "pass through" risks and liabilities related to the services they provide so that banks are able to fulfill their "trusted agent" promise to consumers.

As with many emerging technologies and businesses, it will take time for all stakeholders to discuss and agree on a business model. Mobile payments trials and pilots are currently providing real-world input to stakeholders to answer the key business model questions.

8.3 Application Control

One issue critical to developing a business model is the issue of who controls the proximity mobile payment application on the handset chip. A leather wallet may be a useful metaphor for addressing this issue. Consumers fill their wallets with whatever cards they want to carry. No one buys a separate wallet for each different card.

Mobile operators take the position that they own the applications that reside on the phone, and therefore want to control what applications can be loaded into the wallet. Mobile operators might then control how the wallet functions and what applications can be loaded onto phones and marketed to customers.

However, banks and payment associations must certify the security of the wallet software, and therefore they would prefer to control the wallet itself. Financial institutions fear that the presence of an electronic wallet gives mobile operators a chance to insert themselves between banks and their customers. Continuing the leather wallet analogy, when consumers open their wallets, they choose which payment device to use based upon the merits of the products they carry and the nature of the relationship that they have with the financial institution. By allowing another entity to control the wallet, the products may no longer compete on a level playing field. For example, a bank could pay a mobile operator more to give that bank’s card prominence in the wallet when the consumer would prefer to dictate the ranking and placement of accounts.

In addition, banks may shy away from integrated SIM chips, due to concerns about security and visibility of applications. Combining applications will make it easier for mobile operators but harder for banks.

8.4 Technology Selection

Another consideration in defining a business model is the question of selecting from among competing (and confusing) standards for proximity mobile payment systems. Rapid developments and pilots wrapped in non-disclosures thwart efforts to understand what is available. For example, for OTA secure personalization, standards are proposed by the NFC Forum, the International Standards Organization, the Mobile Payments Forum, MasterCard (a variation of ISO/IEC 14443), and EMVCo.

Another question is what standards apply to the secure element (in which the payment application is stored) or the SIM. The 29 members of GSMA have agreed to the SIM single-wire protocol (SWP), leaving the question open for CDMA-based mobile operators such as Sprint and Verizon.

Until these questions are resolved, banks and mobile operators will continue to struggle with the challenge of how to get started.

8.5 Value Proposition

No new payment type can succeed without a compelling reason for issuers, merchants, and consumers to change. The devices and the personalization process must meet the requirements of speed, convenience, and security.

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8.6 Stakeholder Dependencies

Consumer acceptance is key to the success of proximity mobile payment at the physical POS. Both pilot studies and successful programs running in Asia have shown that consumers like using their mobile phones as a payment device. The success of proximity mobile payment depends on the mechanism being easy to acquire, use, and manage.

Card issuers will need to implement the infrastructure required to issue mobile payment cards securely. Consumers must be able to add payment functionality to their mobile phones and move that functionality easily. Most pilots involved only one card issuer per pilot; card issuers and mobile operators must support and provide the management tools required for one consumer to have multiple payment cards and perform transactions from multiple mobile phones. Mobile phones are becoming fashion accessories, with relatively short useful lives. Consumers are likely to want to carry multiple credit, debit, and prepaid cards in all of their mobile phones and replace them often.

8.6.1 Bank Dependencies

In order to drive adoption, financial institutions should attempt to make proximity mobile payment as easy to use as a standard debit/credit card, if not easier. To gain broad consumer acceptance, the process of issuing proximity mobile payment devices must be easy and straightforward.

When consumers change mobile phones or travel to locations that are not supported by their current mobile operator, they should be able to transfer their financial data, payment card information, and corresponding transaction data easily to a new phone without financial institution or mobile operator intervention.

8.6.2 Merchant Dependencies

Proximity mobile payment faces a chicken-and-egg problem. For such payments to be adopted, consumers not only need mobile phones that support such payments, they also need to be able to make payments at a wide variety of merchants. But merchants must see sufficient consumer demand to justify investing in new POS equipment that supports contactless payment.

A growing number of major retailers are introducing contactless payment programs and installing POS terminals that support American Express ExpressPay™, Discover® Network Zip℠, MasterCard® *PayPass*™, and Visa payWave™. Some retailers are rolling out contactless payment with one particular contactless payment program. However, by installing the new contactless POS terminals that support all of the contactless programs, merchants can add other programs in the future.

Merchants who are currently replacing their POS systems should evaluate their need for contactless payment capability. Most of the POS system vendors now offer contactless payment acceptance capability as an option. Merchants who want to upgrade their current POS systems to start accepting contactless payments can do so by adding intelligent contactless readers.[47] By investing in a POS infrastructure that supports contactless payment today, merchants can prepare to accept proximity mobile payments in the future.

8.6.3 Mobile Handset Manufacturer and Operator Dependencies

For proximity mobile payment to be widely accepted, a sufficient supply of mobile phones must be available that support payment. In addition, low-cost models must be available to consumers. NFC-enabled phones are now starting to be introduced by major handset manufacturers, including recent announcements from Nokia, Motorola, Samsung, Kyocera, Sagem, and LG.

Financial institutions rolling out contactless programs have already selected standard ISO/IEC 14443-based technology for contactless payments. American Express ExpressPay™, Discover® Network

[47] Smart Card Alliance, "Contactless Payments: Delivering Merchant and Consumer Benefits," report, April 2004

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Zip[SM], MasterCard® *PayPass*™, and Visa payWave™ products allow the same interface to be used between mobile phones and contactless POS systems, allowing proximity mobile payments to leverage the thousands of contactless readers being deployed at merchant locations.

However, for mobile phones to support branded financial applications, additional specifications are required that address the following questions:

- How will contactless payment card information be securely loaded into mobile phones? What is the most viable secure personalization process?

  For example, several organizations have proposed their own solutions as trusted third-party personalization bureaus for OTA personalization. However, both the financial institutions and mobile operators have requirements for personalization. In addition, issuers and mobile operators must decide how to manage the static or dynamic security keys associated with their applications to protect the financial payment data.

- How can the issuance and payment processes be made simple for consumers?

  For example, when payment applications are integrated with other mobile phone features, mobile phone manufacturers must provide an easy way to launch the payment application from the phone's top screen menu. Proximity mobile payments must be easy to use to gain full consumer acceptance; having to press numerous buttons is an inhibiting factor.

- How can proximity mobile payment transactions use existing mobile operator text messaging capabilities to eliminate paper receipts?

- How can the issuance and activation process be designed to minimize the impact on handset inventory requirements for mobile operators?

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9. Conclusions

The argument for mobile payments for all stakeholders is compelling. Stakeholders in North America have demonstrated interest in deploying mobile payments and are now actively implementing pilots. To date, however, mobile payment applications have been viewed as providing a competitive differentiator, so are being implemented among specific partners and not in a way that promotes interoperability across the industry.

There are clear benefits for the key stakeholders in offering mobile payment applications.

Mobile operators can:

- Attract new customers.
- Reduce customer turnover by offering new value-added services.
- Add revenues from data services related to payment.
- Encourage consumers to upgrade to more feature-rich NFC-enabled mobile phones.

Financial services providers can:

- Reach new customers and offer new, differentiated payment services to existing customers.
- Increase credit and debit card transaction volume from replacing cash sales.

Merchants can:

- Increase the number of customers making contactless payment transactions.
- Speed transactions for customers using mobile handsets.
- Improve customer convenience and loyalty.

Viable business models must emerge to encourage cooperation across a complex ecosystem. Mobile payment implementation at the physical POS is complex and requires a solid business case and value to be delivered to all stakeholders. Mobile payment requires the deployment of new technology to consumers, merchants, mobile operators and the financial community. New business partnerships must be formed among mobile operators, financial service providers, and mobile device manufacturers. The new services must be presented to consumers and merchants in a way that drives adoption of the new services, while enhancing security and usability. Overcoming these challenges while still delivering benefits to all stakeholders is the key to driving mobile payment implementations successfully.

An open platform is necessary to make mobile payment adoption feasible. The successful implementation of proximity mobile payment is dependent on the industry moving to an "open platform" that makes the payment wallet available to multiple financial institutions, mobile operators, handset manufacturers and contactless readers. This openness is essential in providing the consumer with flexibility and choice in both the handset and payment card to be used. An open system will speed implementation, reduce the need for single operator/one issuer projects, and allow global replication of proximity mobile payment.

The combination of contactless financial payments and NFC technology offers opportunities for convergence. In North America, the current convergence of contactless payment adoption by consumers and merchants, financial industry promotion and support for a standards-based approach to contactless payments using traditional credit and debit cards, and new NFC-enabled mobile devices that are compatible with financial payment standards is driving increased interest in mobile payments and pilot implementations. This convergence provides opportunities for the mobile and financial industries to overcome the challenges to deploying mobile payment at the physical POS and to make mobile payment a reality that delivers compelling benefits to consumers and business stakeholders alike.

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10. Resources

American Express ExpressPay,
https://www124.americanexpress.com/cards/loyalty.do?page=expresspay

Discover Network Contactless,
http://www.discovernetwork.com/resources/data/contactless_payments.html

ETSI, http://etsi.org

Global Platform, http://www.globalplatform.org/

GSM Association, http://www.gsmworld.com/index.shtml

MasterCard PayPass,
http://www.mastercard.com/us/personal/en/aboutourcards/paypass/index.html

MOBEY Forum, http://www.mobeyforum.org/

Mobile Payment Forum, http://www.mobilepaymentforum.org/home

NFC Forum, http://www.nfc-forum.org/

Smart Card Alliance, http://www.smartcardalliance.org

Smart Card Alliance Contactless Payments Resources,
http://www.smartcardalliance.org/pages/activities-councils-contactless-payments-resources

Visa Contactless, http://usa.visa.com/personal/cards/paywave/

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About the Smart Card Alliance Contactless Payments Council

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

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