

# payments system research briefing

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## Complex Landscapes: Mobile Payments in Japan, South Korea, and the United States

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Mobile payments continue to be a much discussed topic in the United States and abroad. While still in the early stages of development and adoption stateside, several countries abroad are further along the continuum. Among the world leaders in adopting mobile payments are Japan and South Korea.

This Briefing article will provide an overview of the mobile payments landscape in Japan and South Korea and discuss developments in the United States. Though each country is unique in its progression toward adoption, challenges encountered are similar. Navigating the myriad relationships among stakeholders such as carriers, financial institutions, card issuers, handset manufacturers, etc., while dealing with issues of technology, has proven challenging for all. In Japan, carriers were instrumental in deploying the technology that enabled mobile devices to be used for payments. And businesses were instrumental in developing the platforms that enabled their customers to use them and merchants to accept them for payments. In contrast, in South Korea, though carriers were the first to offer mobile payments, financial institution involvement in offering mobile banking was critical to inciting consumer adoption. Thus far in the United States,

several combinations of stakeholders have partnered to pilot mobile payments. Which partnership model(s) will likely prevail remains to be seen.

### Mobile Payments in Japan

Prior to 2004, the primary means of initiating mobile payments in Japan was remotely via the Internet. This payment option enables consumers to use their device's Web browser to access merchant sites and order merchandise, services, or content. However, the consumers ultimately pay for their purchases by credit card or another payment method. Today, mobile "proximity" payment (that is, at point of sale) using contactless integrated circuit (IC) chips has become most prevalent. In July 2004, NTT DoCoMo, the largest mobile phone operator in Japan, began deploying mobile devices containing the FeliCa contactless IC chip developed by Sony. The FeliCa chip makes it possible for mobile devices to contain multiple forms of data including personal identification, bank account numbers and balances, credit account information, transit passes, and more. As a result, in addition to facilitating remote payments, NTT DoCoMo phones enabled consumers to use their devices as a substitute for cash and cards at vending machines and merchants' points of sale.

In 2005, the two other main mobile phone carriers in Japan, KDDI and Vodafone (which was acquired by Softbank in May 2006), also adopted FeliCa.

Several businesses developed platforms that enabled acceptance of mobile proximity payments. Mobile carrier NTT DoCoMo developed its own called iD. East Japan Railways developed the Mobile Suica platform. The credit card company JCB developed QUICPay, which is promoted by the Mobile Payment Promotion Association, a consortium of credit card companies, mobile phone carriers, electronic companies, retailers, and so on. Bit Wallet, a joint venture between companies such as NTT DoCoMo and Sony, and some financial institutions, developed a platform called Edy. Mitsubishi UFJ Nicos, an issuer of three credit card brands, developed the Smart Plus platform. And, Seven & I Holdings, the parent company of Seven Eleven Japan, developed the nanaco platform.

Edy, Mobile Suica, and nanaco are based on prepaid products. All three allow consumers to fund their accounts with cash. In addition, Edy and Mobile Suica allow for funding via credit cards or Internet/mobile banking accounts. In each of these platforms, from an operator perspective and as a means of funding, financial institutions' involvement is partial at best. The QUICPay, Smart Plus, and iD platforms are based on post payment. But, while these post-pay mobile proximity payments require credit card companies' involvement, unlike in the United States, many credit card companies in Japan are not financial institutions. Instead, major retailers and manufacturing companies issue credit cards that can be registered for mobile payments. So again, as was the case with prepaid payments, financial institutions' involvement may be partial at best.

In terms of consumer use, all of the mobile proximity payment options, with the exception of iD, can coexist on any carrier's mobile devices; iD is supported only by NTT DoCoMo. Therefore, consumers can download the applications for each payment platform with which they contract to any mobile device that has FeliCa and make purchases using any of the different platforms with one device. In contrast, merchants need to have readers that correspond to each specific platform. However, recently, NTT DoCoMo, East Japan

Railways, JCB, and Bit Wallet agreed to make their readers and data centers interoperable. And it is anticipated that in the near future, Mitsubishi UFJ Nicos and Seven & I Holdings will do the same.

## Mobile Payments in South Korea

In South Korea, mobile payments were introduced earlier than in Japan. In late 2002, the two largest mobile carriers, SK Telecom and KTF, each launched post-pay mobile proximity payment programs, Moneta and K-merce, respectively, that used an infrared technology. For a number of reasons, these programs initially were not very successful. First, they were inconvenient for consumers because scrolling through several series of handset menus was required to complete a transaction. Second, merchant point-of-sale readers were not interoperable with both carriers' devices. And, third, banking and credit card industries were not very enthusiastic about the programs because the mobile carriers demanded a relatively large share of the card issuer's revenue from a transaction.

In 2003, the third-largest mobile carrier, LG Telecom, partnered with the largest bank in South Korea, Kookmin Bank, to launch BankOn, South Korea's first IC chip-based mobile banking service. BankOn adopted single-IC-chip technology, controlled by Kookmin Bank, and did not provide mobile payment services like Moneta or K-merce, but instead enabled its customers to use their mobile devices as a substitute for an ATM or transit card. After the introduction of BankOn, LG Telecom significantly increased its market share in terms of the number of subscribers. The success of BankOn induced the other mobile carriers and banks to offer mobile banking services using IC chips. SK Telecom collaborated with smaller banks and launched a new mobile banking service, called MBank. The MBank offering employs dual-chip technology, where the chip is divided into two parts. Banks control the part which contains account information, and SK Telecom controls the other part, which contains information on its Moneta payment product. KTF also launched a mobile banking service called KBank. Unlike MBank, KBank adopted single-chip technology, where the IC chip is issued and controlled by its partner banks. Further, since early 2006, contactless solutions from Visa (Wave) and MasterCard (PayPass) also have successfully operated in South Korea. With these solutions, a special

SIM-sized credit card certified by the card organizations can be inserted into a mobile device to enable proximity payments. However, because each card is issued by the credit card issuer, customers have to change IC chips whenever they use a payment card from a different issuer. To address this inconvenience, in 2007, SK Telecom launched a new service that enables its subscribers with certain device models to download credit card applications over the air to a SIM card. In addition to credit card applications, consumers also will be able to download mobile banking and public transportation applications onto the chip, so they no longer will need to change those chips each time they use different bank or transit applications. KTF also plans to launch a similar service later this year. LG Telecom likely will do so as well.

As discussed above, financial institutions were heavily involved in the eventual success of mobile proximity payments in South Korea. But, it is likely that mobile carriers will begin gaining more control as mobile devices equipped with single-generic IC chips become more prevalent.

## Mobile Payments in the United States

In the United States, mobile payments are still very much in their infancy. At present, mobile payment initiated remotely either through mobile Internet access or via text messaging is dominant, and, in the case of the latter, nonbanks such as Obopay and PayPal Mobile are the providers of such services. And, save for the provision of supplemental prepaid card options that a provider might offer, these and other nonbank mobile payment offerings require that both the payee and payer be users of the particular payment method.

While there is strong interest in, or at least heightened curiosity about mobile proximity payments, bringing them to fruition is a challenge given the complex nature of the U.S. payments and mobile landscapes. The sheer number of financial institutions, the myriad card networks, mobile network operators, hardware and software providers, and other stakeholders results in a host of challenges and considerations. Nevertheless, a number of pilots or plans for pilots either are under way or have been announced. Among those

are collaborative efforts such as those of Wells Fargo and Visa; Discover Financial Services and Motorola; Citigroup, MasterCard, Cingular, and Nokia; and Cellular South, Kyocera, and VIVOtech, all of which illustrate the magnitude of interest as well as the complexity involved.

Though it is not yet apparent how full-scale deployment of mobile proximity payments will be achieved, other developments in the payments landscape may facilitate the process. One such development is the advent of mobile banking. At the close of 2006, there were announcements of U.S. financial institutions that were beginning to offer mobile banking products. Nine months later, national banks such as Bank of America, Citibank, Wachovia, and Wells Fargo; regional banks such as BancorpSouth, Regions, and SunTrust; and credit unions such as America First, Treasury Department Federal Credit Union, and Mazuma Credit Union (located in the Tenth Federal Reserve District) are among those that have begun offering mobile banking products. Some of these offerings are the result of partnerships between mobile network operators and service providers, such as AT&T working with Firethorn Holdings LLC, Sprint Nextel Corp. partnering with mFoundry Inc., and Verizon working with both. Others are being facilitated by providers of mobile banking-enabling applications that are neither carrier- nor device-dependent.

Whatever the origins, the features and functionalities are relatively the same. Consumers can check their account balances, view transactions, pay bills, transfer funds between accounts, locate ATMs, receive alerts and notifications, and more all from their mobile devices. Existing online banking customers and those more inclined to adopt new technologies appear to be the initial target audiences. But, with more 230 million U.S. wireless subscribers, the potential for adoption is significant. And, in light of the South Korean experience, such mobile banking offerings may become the gateway to offering mobile proximity payment products in the future.

Another payments development that may facilitate the process is the deployment of contactless cards and readers. CardLine reports that JPMorgan Chase issued approximately 20 million credit cards with contactless capability in 2006. And others have followed. For example, Central Bancompany, with affiliate offices in Kansas, Missouri, Illinois, and Oklahoma,

has begun offering MasterCard's PayPass cards to its debit card holders. Meanwhile, merchants such as CVS/pharmacy and Office Depot, quick-service restaurants such as Taco Bell and Jack in the Box, sporting venues such as Arrowhead Stadium and Philips Arena, and a host of others all have deployed contactless readers. Where consumers have had the opportunity to use contactless payments, they reportedly like the contactless nature of the payment and would like the opportunity to use it in more payment interactions. In addition, merchants reportedly have experienced benefits such as quicker transactions and increased ticket size. The demand for contactless card payments will no doubt pave the way for mobile proximity payments.

## Conclusion

As is evidenced by the Japanese and South Korean experiences, there is no prescribed path to successful adoption of mobile payments. In Japan, mobile carriers and other nonbanks have been instrumental in bringing products to market without much, if any, involvement from financial institutions. In contrast, in South Korea, collaboration between mobile carriers and financial institutions was critical to successful deployment and adoption of mobile payments. In fact, mobile banking seemingly facilitated the process. How mobile payments ultimately will be adopted in the United States is yet to be seen, but indicators suggest that it will be evidenced sooner rather than later.

## payments system research

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