

Mobile Payment Technologies

Executive Summary

Mobile payments are emerging technologies which allow companies and customers to interact in ways not previously possible. Diverse approaches to accomplish payments via mobile devices have carved the way for three main payment methods: SMS text messages, payments via the mobile web, and near field communication (NFC) technologies. Independent of the payment medium, there are also multiple transactional methods to process the payment. These methods include using existing credit cards, using existing bank accounts, debiting mobile accounts, or debiting an online wallet.

While each form of mobile payment technology has its own distinct advantages, NFC has been cultivating the most buzz in the market. Reports detail that Google and Apple are both planning on implementing the technology required to perform NFC transactions with their next generation devices. NFC technologies not only open the door for mobile payments and the ability to combine multiple credit cards, rewards programs, etc, but also other various interactive marketing possibilities. However, in order for consumers to adhere to this new technology, the advantages will have to be weighed against the risks. Cost and security reasons are two main roadblocks which could inhibit adoption.

The retailer also plays an important, if not pivotal, role in mobile payment technology. In order for customers to be able to use their technology, retailers will need to implement forms of mobile payment technology. Retailers have an incentive to increase speed of checkout and offer more loyalty programs. However, new technology does not come without a price. Retailers will face the significant capital investment requirements to implement technology, as well as offer discount incentives and marketing campaigns to increase customer awareness and provide incentive for the consumer to adopt the new technology.

Though there are hurdles to implementing a wide scale technology change, there are applicable cases where mobile payment technologies have been successfully implemented. Examples include the Japan, Singapore, and Hong Kong where mobile payments have been successfully implemented in vending, retail and public transit systems.

Outline of Technology

The three brief stories below sum up the various ways different mobile payments may be handled:

A Japanese student wants a soda from a vending machine. Having nothing in his wallet to purchase the beverage with, it seems he would be out of luck. However, he pulls out his cell phone and sends a text message of the corresponding identification number to the short code advertised on the machine. The machine processes the code and communicates with the student's mobile service provider. The provider issues a confirmation code of payment booked to the student's mobile account, and then the machine dispenses the soda.

An American walks into a Starbucks looking for a cup of coffee. Having just downloaded a new application on her cell phone, she is really excited to try her mobile gift card. She orders her coffee, pulls out her mobile phone and loads the Starbucks application. The application displays a bar code of her mobile gift certificate, the individual places her phone under the bar code scanner on the counter, and a few seconds later the phone issues confirmation of receipt. She waits to receive her drink.

Fast forward one year or so into the future, that same person has upgraded to a new cell phone and put all her payment information on her mobile wallet. She has just finished her shopping at her favorite retailer. When she gets to the register, instead of swiping her credit card she places her phone on the near field communication reader on the counter. The reader then communicates with her bank, Credit Card Company, or an online system like PayPal and initiates a payment with the retailer.

Methods of Customer Interaction

Customers may interact with a mobile payment scheme in three ways: by sending an SMS text message, by interacting with a mobile web site or application, or by setting their Near Field Communication enabled phone on a receiver.

First, an SMS text message is the oldest method of payment and is the method illustrated in the first story above. This payment method was very common in Asia a few years ago and implemented in numerous street level items like vending machines. It works by allowing the consumer to send a text message, usually using a short code, to another device (Wikipedia - Mobile Payments). This device receives the short code text along with a code signifying the payment is complete; at that point, the machine issues the desired merchandise to the consumer.

Another method of payment is using the mobile web. A mobile application is essentially a website specifically designed for the user's phone where they may find useful information or purchase

items like books or even other applications. While we probably don't think of it as a form of mobile payment, this method applies to things like "app stores" put in place by many phone operating system providers today. The concept of purchasing a mobile application from an app store on a user's phone was made popular by the Apple iPhone. The user browses a list of applications which can be purchased, at the time of purchase the application will know the users credit card information and charge the card before they download the application. It is worthwhile to note, that the form of payment doesn't have to use a credit card but this is the most commonly implemented method today (Wikipedia - Mobile Payments).

This mobile payment approach was recently expanded by the Starbucks Corporation as discussed in more detail later. The coffee retailer now offers an application that essentially acts as a mobile gift card. Consumers can preload an amount with a credit card using either the application or through the internet. When they order their coffee, a barcode is displayed on the user's screen, which they hold up to the in-store bar code scanner to credit their pre-paid account (Web 2.0). This method is a relatively new technology and requires retailers to invest in bar code scanners that can scan digital screens. However, it is a method that uses existing payment infrastructure and saves confusion for consumers. It remains to be seen if consumers will accept an approach that would require a different application for each of the retailers they frequent for this type of scheme to take off.

Finally, the up and coming approach to mobile payments involves a technology called Near Field Communications (NFC). NFC systems work by embedding a NFC hardware chip into the phone itself; similar in nature to a radio-frequency identification (RFID) chip. As illustrated in the third story in the introduction, a consumer could do their shopping as they normally would; at the time of payment, instead of retrieving a credit card or cash, the consumer would place their phone on a receiver. The receiver would acknowledge the user and charge the corresponding account information (Wikipedia - Mobile Payments). It would effectively be a form of payment that uses the same ideas as consumers are used to now, however it would require hardware investment on the part of both the consumer in the form of new phones and on the part of the retailer in the form of receivers. While this technology is still largely on pilot drive, Japan has already deployed a version of this technology called Felica throughout most of the country.

Methods of Processing Payments

After the consumer has effectively “checked out” using one of the mobile payment technologies previously described, there are four methods of payment processing that may exist: using existing credit cards, using existing bank accounts, debiting mobile accounts, or debiting an online wallet. The four methods may be split into two groups by linking of credit cards and bank accounts as existing banking infrastructure or creating new structures such as direct billing to mobile accounts or using online or mobile wallets.

Existing banking infrastructure uses credit cards or the automated clearing house to transfer money from the consumer to the retailer. Today’s credit card infrastructure works by setting aside a specific amount of the consumers credit limit for the requesting retailer. The retailer is generally charged a fee for the privilege of using this service; this fee is usually in the form of a percentage of the transaction amount but may include a fixed amount per transaction as well. Mobile payments may work by charging these credit cards in the same way current websites do today. This would be especially popular with the WAP based interaction schemes as the infrastructure has already been figured out on the existing web space for example in the Apple App Store where this is already common (Wikipedia).

The automated clearing house has been the format for transferring check based money between a consumer and retailer for years. As paper checks have declined, retailers (especially online) have figured out how to make the most of the existing infrastructure by using this to process electronic checks. This payment processing method begins when a user provides the routing number and bank account number to a retailer along with a sort of digital signature. The retailer sends the information to the federal clearing house with their authorization. When everything has cleared, the consumer’s bank credits the consumers account and debits the transfer to the bank of the retailer. This method of processing payments has the advantage of avoiding the fees associated with accepting credit cards (Wikipedia).

There are two new forms of infrastructure that may also become common. The first has already been in use in Asia where a user’s mobile account is debited to be later paid for by the consumer at the time they pay their bill. The second would be using existing mobile/online wallet program such as PayPal or new schemes that may be invented.

Mobile account debiting works by the user providing their phone number to an accepting payment device, the payment device then recognizes both the phone number and the associated carrier. The payment device asks the mobile carrier to verify they have debited the consumers account.

When the mobile carrier replies to the payment device with a verification code, the payment device authorizes the transaction and sends the user on their way. This method has been common for some time in Asia as the case study at the end suggests. There is recent evidence it may be gaining a foothold in the US however as Danal, a Korean mobile payment provider, owned BilltoMobile has signed deals with three of the four major US mobile carriers (Takahashi, Dean). This would allow mobile carriers to effectively act as credit card issuers and trust they will receive the payment from their consumers. Mobile carriers would have no recourse from the merchant if a consumer didn't pay. For the retailer, it's likely that mobile carriers would provide some type of transaction fee similar to credit cards today.

Using an existing online wallet program such as PayPal would be another method of new infrastructure that isn't being used much today. However, PayPal has recently announced a cash prize for the development of a mobile application that uses PayPal's payment scheme in a mobile application (X.com). There are plenty of competing schemes in existence today with PayPal, Google, and Amazon all providing their own spin on this method of retrieving payments but they work much the same way. This payment processing methods begins when the user deposits an amount of money into these accounts similar to how they would a bank account. At the time of payment, the mobile device would issue a transfer from the user's online wallet to the retailer's bank account. This would have to be very similar, and may even use, the ACH process discussed above or a similar spin on the same philosophy.

Any of these methods of customer interaction or payment processing may be used together to provide the basic payment infrastructure. However, an industry standard has yet to be set and no form of payment processing has proven to be the dominant form.

Technology Required by the Consumer

As previously mentioned, current phones already have the ability to issue payments using either text messages or credit cards (via applications or other online wallet). While mobile payment not be as mainstream as paying for groceries, restaurants, or gas with phones yet, purchases are already being made using phones via app stores like Apple's. As a result, the following will outline the necessary measures for a transition to NFC technology.

Consumers will have two things to do to transition to NFC mobile payments. First, they will have to purchase a new phone. Phone's containing NFC technology may be set to a slightly higher price tag as the NFC chip itself is expected to raise the manufacturing cost of mobiles between \$10 and \$15 (Eichenbaum, Peter and Margaret Collins). Second, they will have to make a personal security decision to add their banking information onto their phone. According to the Boston Federal Reserve, mobile payment solutions are no less secure than the current credit card infrastructure (Eichenbaum, Peter and Margaret Collins), however, consumers don't seem to believe it as a recent survey by Accenture indicated only 26% of US respondents indicated they would use their phone for mobile payments (Clark, Sarah).

There is evidence that consumers who desire to use mobile payment technology will have a device to purchase later this year. New devices are already hitting the market waiting for retailers to catch up with all three major Smartphone operating systems touting NFC ready devices coming this year. The Google Nexus S, which was released in December of 2010, has an NFC chip inside it already. This is the first of the Android running devices that has this feature but more are expected to be shipped later this year. Furthermore, the latest release of the Android operating system included a software API for use with an NFC chip allowing for both Call and Response actions (Meagher, Stewart). Google is banking on NFC technology for more than just payments and intends to find a way to expand on their advertising bandwidth. Their vision is to use the technology for live advertising as people are walking down the street (Heng, Michelle).

However, Google is not the only company developing an NFC related infrastructure. Rumors are rampant that the iPhone 5 will be launched this summer with an NFC chip embedded inside. A patent application for a system called an "e-wallet" was discovered on an Apple applied patent, presumably for an iPhone (Soloman, Kate). This rumor was essentially confirmed by Deutsche Telekom on February 15, 2011 when they announced Apple as a partner for a new mobile wallet program they are rolling out to all their subscribers' later this year. This is excellent for those subscribers in Europe where the iPhone is available on their service, it remains to be seen just what will happen with Deutsche Telekom owned T-Mobile since they are not a supported iPhone carrier in the US today.

Research in Motion co-CEO Jim Balsillie confirmed they are also looking into the technology stating, "Many if not most BlackBerry devices throughout the year will have NFC in them" (Albanesius, Chloe). Very few specifics are available around just what type of implementation RIM would provide but

they would have plenty of support from other companies trying to get in on the NFC flood as we will discuss in the next section.

Technology Required by the Retailer

For any to implement mobile payment technology, they first need expertise in the mobile space especially from a programming stand-point. As mentioned previously, there are many different ways mobile payments may work and a defined strategy and adept programming technique is necessary in either case. Beyond that, the actual hardware and software they need is largely dependent on the type of system they implement.

The first type of system available to them is to be a purely online brand much like Amazon. Amazon allows you the ability to buy items via their website, but this is effectively the same as using a browser on a computer and therefore more of an extension of the web than a new payment method.

The second option, and an option much more based on true mobile technology, is the one implemented by Starbucks. Essentially, it works by providing a bar code on the phone that is readable by the bar code scanners at their Point of Sale system. However, not just any bar code scanner will read a mobile phone screen and this will require special investment of bar code scanners that can read a mobile screen.

Third is to implement an NFC solution. This is very similar to today's credit card machines. They are a small add on to the retailers Point of Sale system much like modern credit card machines at grocery stores all over the world. They work by having a small receiver inside the system, when an NFC capable cell phone is placed on top of the receiver it retrieves the information and processes the payment similar to how credit cards are processed today (Kim, Ryan). The estimated cost of one of these systems is about \$200 (Eichenbaum, Peter and Margaret Collins), but it's unclear if this can double as a credit card reader or not, potentially cluttering payment counter spaces more than a retailer would be willing to do.

However, the technology is only the beginning of the retailer's requirements. This may also require that they completely renegotiate the existing payment contracts that they have as mobile payments threaten the business model that has led to the success of Visa and MasterCard. Retailers have some motivation to do this; they have been fighting with Visa and MasterCard for more favorable

interchange fees for some time. These are fees that retailers pay for the privilege of accepting credit cards and are generally between 1% and 2% of a transaction however, the overall revenue from these fees exceeds \$40B a year (Eichenbaum, Peter and Margaret Collins).

Still, there are several different methods of developing the infrastructure and a lot of stakeholders are coming up with ideas on how to manage the space. Credit Card companies are developing their own system of mobile payments, cell phone carriers are looking at new methods of payment that use their own service and bypass the credit companies. Still other mobile wallet providers are trying to find a different solution all together such as the PayPal crowdsourcing prize previously mentioned. Regardless of how the technology works, it's clear that there are numerous business models in existence that the retailer would have to available to use.

Potential Benefits and Drawbacks for Consumer

Mobile payment technology, and more specifically, NFC technology will open the doors to an entirely new way for consumers to interact with the world. Foremost is the ability to combine multiple check/debit cards, credit cards, gift cards, rewards cards, event tickets, door keys, etc all in to one package (Mobile Storm). This package, the mobile devise, is also something that most consumers are already carrying with them. Wallets will become smaller, if not obsolete, and purses will provide more room for the essentials.

In addition to completely replacing the credit card, mobile payments could also help to avoid some of the hefty interest rates associated with those cards. A company call Mopay offers mobile payments with billing directly to the consumer's phone bill (Crosman, Penny). Avoiding fees though assumes that the consumer then has sufficient money to pay off their phone bill in a timely manner. This billing method has also allowed Mopay to reach an untapped consumer market, "The unbanked." A recent National Geographic study states that the "average" person in the world has a cell phone, but less than 25% of the world's population has a bank account (Boyle, Alan). Consumers whose purchases were limited to physical retailers where cash is accepted now are able to purchase online without having to own a credit card.

Another large benefit of mobile payments for consumers is an easier use of peer-to-peer payments. Companies like Paypal have long offered solutions for one consumer to transfer money to

another on-the-fly and across banking networks (Sherter, Alain). Mobile Payments will be able to take this foundational technology to new levels. Imagine not only being able to transfer money to someone anytime, anywhere, but with efforts no more difficult than waving your phone next to one of your friend's using NFC technologies.

Many benefits exist beyond payments for NFC technology integration with mobile platforms. The ability to interact with NFC capable devices embedded in various marketing vehicles, such as billboards, opens the door for unlimited company-consumer interaction. Take for example the recent regional implementation of NFC marketing interactions soon after Google's launch of its Nexus S phone. Previously, companies such as retailers, restaurants, etc were posting stickers with QR codes (matrix barcodes) that consumers could scan while walking by. Scanning these stickers with their mobile devices would bring the consumer directly to the Google Places listing for that company. These stickers were then upgraded with NFC technology to allow the consumer to simply touch their device to the sticker to get more information (Clark, Sarah "Google Launches...").

Marketing capabilities with NFC technologies open endless possibilities. Imagine you walk by an advertisement for an upcoming concert. Simply swiping your phone by the billboard could allow you to sample some of the musician's songs and bring you directly to a commerce application which allows you to purchase tickets for the concert. Or perhaps the advertisement is for a particular restaurant. This time, placing your phone by the NFC transmitting device allows the consumer to download a time sensitive coupon, book a reservation, and download directions right to the restaurant's location.

Not only will the consumer benefit from additional information in the outside world, but also when already inside a retail location. Recent technology has allowed consumers with mobile devices to scan current bar codes. Consumers are then able to compare prices with other retailers and learn more information about the product before buying (Perez, Sarah). A company called Mobile Tag has also added the support for NFC bar codes to its application to allow consumers to simply swipe their mobile device by the tag to retrieve vital information instead of having to take a picture (scan) the bar code (Clark, Sarah. "Mobile Tag launches...").

While there are many benefits to consumers in the mobile payment world, there are many potential concerns, drawbacks, and threats. Foremost, as there is no current industry standard the potential for a consumer to manage many mobile payment techniques could overshadow the benefits of not using traditional payment methods. If a consumer has to manage many different "applications" on

their phone for the various different payment methodologies, the consumer may prefer using a credit card instead. In terms of mobile payments that require a physical technology enhancement (such as NFC), the costs required by the consumer to upgrade their mobile device may be too great.

Loss of the consumer's mobile device also poses a significant risk. If all of the consumer's methods of payment, rewards, and identification are stored on one device, then losing such device could be costly, time consuming, and pose as a significant security threat. Companies will have to provide some sort of method to transfer a consumer's account from one device to another in order to provide ease for consumer, and a way to "deactivate" the account on the lost device and to avoid the risk of someone else using their sensitive information. The loss of property risk, however, is not much different than the consumer losing his/her wallet or purse in so far as he/she would have to cancel each lost credit card and apply for a new identification card. If the correct online user experience is created, transferring one's account from one device to another when lost may in fact be easier than the actions required when losing one's wallet or purse. In addition, the association of rewards programs, etc with mobile technologies instead of a standard "punch card" could provide the consumer with a way to recover rewards when lost. This added ability could be a benefit to mobile technology when considering the loss of property threat.

NFC also poses a significant number of security concerns. Since NFC is based upon radio frequency transmissions between two devices, concerns similar in nature to those of RFID technologies could occur: eavesdropping, data corruption, data modification, data insertion, and man-in-the-middle attacks. Each pose a significant threat to data quality and integrity to both the consumer and retailer will require additional measures such as encryption and/or frequency monitoring to be researched and implemented before the technology can be safe (Haselsteiner, Ernst and Klemens Breitfu).

Potential Benefits and Drawbacks for Retailer

The introduction of Near Field Communication (NFC) will change the way consumers and retailers approach daily life. With NFC, consumers will be able to pay for products or services with their mobile device electronically from their phones replacing the need for cash or a credit card. The idea of mobile payments has been met with mixed feelings from both consumers and retailers for a variety of reasons. As can be expected, the security of personal information is very important as well as the

transaction cost of a payment. The majority of retailers will continue to be apprehensive about mobile payments until common concerns are resolved.

In today's fast paced world, people are looking for ways to do more with less time. To enhance the customer experience, retailers would like to be able to provide their customers with mobile payments and limit the amount of time spent in line waiting to pay. Starbucks decided that they did not want to wait for consumer and retail concerns about NFC to be resolved, so they created an interim solution to the problem. Instead of using NFC, Starbucks is using mobile payments with a barcode. In January of 2011, Starbucks launched an app that works with the iPhone and blackberry allowing consumers to pay for their coffee with a pre-paid balance on their phone. The pre-paid balance is available through a Starbucks card which is purchased by way of credit card or PayPal. The amount of time consumers spend waiting in line to pay for products is reduced using the new form of payment, allowing Starbucks to service more customers in less time (Web 2.0, 2011).

In addition to the increased speed at the register, Starbucks is also giving back more to the consumer in the form of loyalty points for using the new mobile payment system. While the speed of service may entice many consumers, others will need more encouragement to avoid paying with a credit card or cash. To persuade additional customers, Starbucks has started a promotion for people using the Starbucks Card Mobile system when purchasing products at their stores. The popular "Starbucks Reward Program" is available for customers using mobile payment, rewarding customers for paying with their mobile device. Each time a customer pays with their mobile phone they earn loyalty rewards, the same as using the Starbucks card. Starbucks is giving the customer faster service and incentives for using mobile payments. The innovative and fast-paced clientele of Starbucks has embraced the technology...will the majority of society follow suit (Deatsch, Katie).

While Starbucks has taken the step into mobile payments, other US retailers are not as eager to move forward. There are explanations as to why the US has not adapted mobile payments as other countries have. As Starbucks has experienced, there is a cost of service to the retailers in the form of discounts, incentives and marketing. The extent of actual cost is not only dependent on the retailer, but also on the consumer. In addition, there will inevitably be a start up cost for the retailers to accommodate new software, scanners, and training for employees. Even Starbucks will need new equipment for NFC when implemented. And finally, there will need to be synergies between multiple parties to ensure the success of mobile payments: phone companies, service providers, banks, and retailers.

The level of desire to try new technology varies with each individual. For retailers to persuade people to use mobile payments, they will need to entice consumers with more than speed and the ability to use a new technology. Retailers that are able to provide a discount on the product, or an incentive program for using mobile payments are likely to see a higher adoption rate than those without financial motivation. Partnering a marketing campaign with discounts and/or an incentive program would allow a retailer to reach a broader spectrum of consumers in less time. People are enticed by new gadgets, but pairing new technology with a cost savings will lead more consumers to try mobile payments (Baburajan, Rajani). A retailer that launches mobile payments with an incentive program within a marketing campaign is more likely to be successful than a retailer without discounts, a loyalty program, or a marketing program that alerts their consumers about the availability of mobile payments.

Currently, retailers use point-of-sale (POS) systems to accept cash or credit card payments for products or services. Going forward, retailers would need POS systems that would also accept mobile payments. The existing functionality of the POS software does not allow for mobile payments and would need to be altered to accept payments from mobile devices. The modification to retailer POS systems would be a large upfront cost to retrofit all stores to accept mobile payments. In addition, it is unknown what types of software upgrades might be available, or additional equipment would be necessary for mobile payments (Baburajan, Rajani). Each retailer would need to determine whether the cost is worth the estimated return from the customer. Starbucks decided that waiting for NFC to fully develop was not worth the wait, so they developed their own solution. The estimated return on investment indicates that Starbucks made a correct decision to move forward. Despite launching an interim solution, Starbucks is still working on their own NFC plan to remain competitive with other retailers (Deatsch, Katie).

A key to success for mobile payments is collaboration between the phone companies, service providers, banks and retailers. A mobile payment transaction will not be any less complicated, perhaps even more so. Each time a consumer purchases a product, each company involved in the transaction takes a portion of the sale. Without each company, the transaction would not have been able to take place. Since each company is necessary in the transaction, all of the companies need to work together to determine how to handle the fees associated with the transaction. Retailers are accustomed to paying a certain percentage of credit card sales to banks and processors. The assumption is mobile payments will cost less for the retailers. Unfortunately, there are more parties involved in each transaction which might cause the cost per transaction to increase for retailers. Prior to launching on a broad scale, the

allocation of transaction fees should be agreed upon by each company involved in mobile payments (Schuman, Evan).

Overall, retailers will be able to provide their customers with a more seamless transaction at the counter and enhance their shopping experience with mobile payments. Starbucks adapted a current loyalty program to mobile payments and marketed both to their customers. As a result, Starbucks is seen as innovative, cutting edge and rewarding to their customers. In turn, Starbucks' customer loyalty has increased (Web 2.0). Mobile payments are available in other countries, indicating adoption in the US should be right around the corner. Starbucks has started a trend in the US, with more companies sure to follow in the near future.

Case Study

Mobile payment technology has existed for quite a few years in form of SMS-based services, which can be quite cumbersome compared to more advanced technologies. However, with the rise of contactless smart cards being used for micro-payments, with success stories in vending machines and public transport, and with the increasing capability of mobile phone, a number of wireless payment vendors started to look to mobile phone payment as the ultimate payment method via short range wireless technology (such as NFC).

The most successful attempt to date is in Japan, where DoCoMo (Japan's largest mobile network operator) and Sony combined forces to provide FeliCa technology - a wireless payment service - on DoCoMo's i-mode platform.

After the launch of FeliCa six years ago, July 2004 to be precise, sales of FeliCa reached 1 million units within five months. In the Feb 2005, it reached 2 million (Wikipedia). All this took place before the adoption of 3G technology. Later in the same year, DoCoMo launched its own brand of mobile credit called iD and by 2007, DoCoMo had over 100,000 shops accepting this form of payment in addition to more than 5 million users signed up for the credit brand. The 100,000 shops do not including any vending machines (Wikipedia). By November 2008, 40 million phones with the FeliCa system had been sold in Japan alone.

Even with this large subscription base and numerous shops having kiosks to receive mobile payments, broad usage within Japan was still to be achieved. 90% of all active users are the young users group who's limited by the Mini plan. About 30% of all registered users actually use the service.

The low percentage of the usage at least can be partially explained by the concerns people have about safety. A large number of users don't want to put their credit information and/or prepaid payment accounts onto the phones. It also faced the difficulty for wider adaptation because people are simply resistant to changes - even in Japan which is renowned for first adoption newer technologies.

But DoCoMo and other network operators do see improvements of mobile payments year over year through their continuous push on this technology. In order to further expand the number of merchants that would install the mobile payment terminal, DoCoMo and other large mobile network operators are not shy to use their money to buy into the big retail chains. DoCoMo spent 73.7 million to buy 3% stake in Japan's third largest convenience-store chain, Faimly Mart. It also bought 2% share of Lawson, the No. 2 chain. It is also setting up a number of joint ventures with the likes of Coco-Cola and McDonald's. If the plan succeeds, the mobile payment will find synergy with other forms of electronic media such as e-coupons and e-promotions, which can bring a lot of added value to users.

From Felica's success in Japan, Sony, Fillips, and a number of other companies embraced a wireless technology called Near Field Communication (NFC), which can establish connections between devices at a range of about 10 cm and delivers throughputs of 424 kps. NFC is compatible with most smart cards and built-in chips such FeliCa and MiFare - developed by Fillips, further it can interoperate with Bluetooth and Wi-Fi.

To-date, mobile payment system has been deployed to Hong Kong, Singapore and Japan's transit system, and the general wisdom on the street says, whatever Japan does, the rest of the world will following in 2-3 years.

The widely expected adoption of wireless payment will see plenty of roadblocks. Four obstacles stood out immediately:

1. Since systems like FeliCa and Mifare are build into the phone, who would be the one to transfer the data at the end of the phone's life? If one lost his phone, how would he protect his data? This concern is addressed by DoCoMo network provider in Japan. As the dominate provider who has power over mobile phone companies, DoCoMo brought the Mobile phone life cycle

management in house. But how this problem would be addressed outside of Japan where mobile phone makers dominate the market, it is entirely unclear.

2. The mobile service operators rarely have the know-how and the experience in dealing with the large amount of transaction data. In order for them to be successful, they have to bring in phone manufacturers, and banks to the table. This presents a special challenge, because each of the three parties are in very different markets and have their own share of interests to pursue. To get all three to cooperate is easier said than done.
3. The mobile phone payment will put another burden on mobile phone users. Already it is cumbersome to keep one's phone safe, locked, and well managed in terms of all the contact information and apps, now users also need to become savvy about using it for payment. Would using mobile payment be easier and cheaper than using a credit card? The verdict is still out on this one.
4. The majority of Mobile phone users are young people, and amongst them kids, teenagers and young adult are the predominantly active users. For mobile payment to lift off, they need to be involved. At the same time, many of them do not have and are not qualified to get a credit card. Yet mobile payment is a form of credit card.

In Japan, this problem has been addressed by DoCoMo's service called DCMXMini. Which allows young users to spend with a monthly allowance of 10,000 yen. The spending shows up in the phone's bill, and is automatically withdrawn from the user's bank account.

This solution is possible in Japan because DoCoMo has its own credit brand, and it is Japan where mobile network operators control phone makers. Elsewhere in the world, phone maker has more power than mobile networks (example, Apple iPhone). How to balance the responsibility of handling credit card and letting the kids, teens and young adults to use mobile payment remains to be seen.

Conclusion

To summarize, we are experiencing rapid technological advancement in mobile space. Amongst SMS text payment, mobile web and NFC technologies, NFC holds the greatest potential to unify mobile and payment transactions as we know today. Through some relentless experimentation, companies across the world are testing the market and consumers acceptance of the technology. The promise is that with a wave of a hand and widely available terminal readers, transaction types such as credit,

banking, micro-payment exchange become possible in just a few years of time. There are plenty of unknowns and roadblocks ahead, resistance from users and retailers, market and profit sharing schemes amongst the shareholders, responsibilities and ramifications of using such a mobile device all represent huge- if not insurmountable- challenges to the industry. Right now, all eyes are on Japan to see how its country wide commercialization with mobile payment would pan out.

Bibliography

Albanesius, Chloe. "RIM's Balsillie: NFC Coming to 'Many if Not Most' BlackBerrys This Year." PC Magazine. 2011 February 16. 2011 March 06. <http://www.pcmag.com/article2/0,2817,2380419,00.asp>

Baburajan, Rajani. "Policy Management – Mobile Payment Providers' Interaction with Merchants Ensures Success of Mobile Commerce." TMCnet. 2011, February 25. 2011, March 06. <http://policy-management.tmcnet.com/topics/policy-management/articles/148475-mobile-payment-providers-interaction-with-merchants-ensures-success.htm>

Boyle, Alan. "'Typical face' is Chinese ... for now." MSNBC. 2011 March 06. http://cosmiclog.msnbc.msn.com/_news/2011/03/04/6190136-typical-face-is-chinese-for-now

Clark, Sarah. "Survey shows consumers will adopt mobile payments, despite security fears." Near Field Communications World. 2011 February 18. 2011 March 06. <http://www.nearfieldcommunicationsworld.com/2011/02/18/36066/survey-shows-consumers-will-adopt-mobile-payments-despite-security-fears/>

Clark, Sarah. "Google launches first NFC marketing service." Near Field Communications World. 2010 December 10. 2011 March 06. <http://www.nearfieldcommunicationsworld.com/2010/12/10/35400/google-launches-first-nfc-marketing-service/>

Clark, Sarah. "Mobile Tag launches mobile barcode and NFC marketing platform, raises €6.6m." Near Field Communications World. 2011, February 18. 2011, March 06. <http://www.nearfieldcommunicationsworld.com/2011/02/28/36249/mobile-tag-launches-mobile-barcode-and-nfc-marketing-platform-raises-6m-euros/>

Crosman, Penny. "Mopay Rolls Out Mobile Payments That Bypass Banks; Offering mobile payments to the unbanked, by billing payments to their landline phone bill." Bank Systems and Technology. 2010 July 20. 2011 March 06. <http://www.banktech.com/showArticle.jhtml?articleID=226000050>

Deatsch, Katie. "Cream, sugar and mobile payments, please; Starbucks has launched Starbucks Card Mobile, an app for iPhone and BlackBerry smartphones." Internet Retailer. 2011, January 27. <http://www.internetretailer.com/2011/01/27/cream-sugar-and-mobile-payments-please>

Eichenbaum, Peter and Margaret Collins. "AT&T, Verizon to Target Visa, MasterCard With Smartphones." Bloomberg. 2010 August 02. 2011 March 06. <http://www.bloomberg.com/news/2010-08-02/at-t-verizon-said-to-target-visa-mastercard-with-smartphones.html>

Halfacree, Gareth. "Deutsche Telekom confirms iPhone 5 NFC rumours; T-Mobile owner drops Apple's name as an NFC partner." Thinq. 2011 February 15. 2011 March 06. <http://www.thinq.co.uk/2011/2/15/deutsche-telekom-confirms-iphone-5-nfc-rumours/>

Heng, Michelle. "Google NFC Tech May Give You the Bump You Need." Zippy Cart. 2011 January 07. 2011 March 06. <http://www.zippycart.com/ecommerce-news/1988-google-nfc-tech-may-give-you-the-bump-you-need.html>

Soloman, Kate. "Apple e-wallet icon spotted in patents, NFC coming to iPhone 5?" Tech Radar. 2011 February 24. <http://www.techradar.com/news/phone-and-communications/apple-e-wallet-icon-spotted-in-patents-nfc-coming-to-iphone-5--930903#ixzz1GCfiUFU2>

Kim, Ryan. "Verifone: All New Point of Sale Terminals Will Get NFC." Gigaom. 2011 March 04. 2011 March 06. <http://gigaom.com/2011/03/04/verifone-all-new-point-of-sale-terminals-will-get-nfc/>

Haselsteiner, Ernst and Klemens Breitfu. "Security in Near Field Communications (NFC)." 2011, March 06. <http://events.iaik.tugraz.at/RFIDSec06/Program/papers/002%20-%20Security%20in%20NFC.pdf>

"How Near Field Communication (NFC) Could Alter The Mobile Landscape." Mobile Storm. 2010 January 19. 2011 March 06. <http://www.mobilestorm.com/resources/digital-marketing-blog/how-near-field-communication-nfc-could-alter-the-mobile-landscape/>

Meagher, Stewart. "Android 2.3.3 gets near-field communications; Contactless payment for Gingerbread." Thinq. 2011 February 10. 2011 March 06. <http://www.thinq.co.uk/2011/2/10/android-233-gets-near-field-communications/>

“PayPal X Developer Challenge for Android.” 2011 March 06. Paypal X Developer Network.

<https://www.x.com/community/ppx/devchallenge>

Schuman, Evan. “Apple’s NFC Rumors May Be True, But Irrelevant. Mobile Payment Is Visa’s Call.”

StorefrontBacktalk. 2011, January 26. 2011, March 06.

<http://storefrontbacktalk.com/securityfraud/apples-nfc-rumors-may-be-true-but-irrelevant-mobile-payment-is-visas-call/#ixzz1F5hjB8F3>

Perez, Sarah. “Stores Clueless About Mobile Barcode Scanning Applications?” Read Write Web. 2008

December 03. 2011 March 06.

http://www.readwriteweb.com/archives/stores_clueless_about_mobile_barcode_scanning_applications.php

Sherter, Alain. “P2P Payments Are Coming, and the Credit Card Companies Won’t Like It.” B Net. 2010

February 24. 2011 March 06. <http://www.bnet.com/blog/financial-business/p2p-payments-are-coming-and-the-credit-card-companies-won-8217t-like-it/3966>

“Starbucks launches mobile payment programme across the US.” Web 2.0. 2011, January 19. 2011,

March 06. <http://site14.fourfiveone.com/2011/01/19/starbucks-launches-mobile-payment-programme-across-the-us/>

Takahashi, Dean. "BilltoMobile scores deal with Sprint for direct mobile payments." Mobile Beat. 2011

February 18. 2011 March 06. <http://venturebeat.com/2011/02/18/billtomobile-scores-deal-with-sprint-for-direct-mobile-payments/>

Wikipedia. 2011 March 06. http://en.wikipedia.org/wiki/Credit_cards

Wikipedia. 2011 March 06. http://en.wikipedia.org/wiki/Automated_Clearing_House

Wikipedia. 2011 March 06. http://en.wikipedia.org/wiki/Mobile_payments Wikipedia.

2011 March 06. <http://en.wikipedia.org/wiki/FeliCa>

Wikipedia. 2011 March 06. <http://en.wikipedia.org/wiki/Telco>