Mobile Payments
By Anuj Anand

In the present decade, the new payments revolution combines two main subsets of mobile commerce—mobile payments and mobile banking.

M-Payments (as it is called) are a point of sale payments made through a mobile device such as smart phone or personal digital assistant (PDA).

It can also be defined as "any payment where a mobile device is used to activate and/or confirm the payment."

Or

Payment for products or services between two parties where-in the mobile phone plays an important role in the completion of the transaction and realization of the payment.

Where as Mobile banking, remains the exclusive domain of financial institutions that have an existing deposit relationship with a consumer. While mobile banking services can enable mobile payments, the reverse is not true.

Both the subset of mobile commerce is expected to grow at an exponential pace in the near future. Some of the analysts have hinted that, global mobile payments will be worth $ 55 billion in 2008.

Evolution of Mobile Payments

Mobile payment still remains as the one of the globally discussed topic as of now. Thou the global market has witnessed a lot of changes in the case of mobile payments, but still the world leaders in adopting mobile payments are Japan and South Korea.

Mobile payments in Japan

Before 2004, the primary definition of initiating Mobile Payments was via the Internet. This method of payment enabled the consumer to use the device's web browser to access merchant sites and order merchandise, services and content. The payment of the transaction will be done by a credit card or any other method. In today scenario mobile "proximity" payments (at the point of sale) using Contact-less Integrated Circuit(IC) Chips has been the most prevalent.

In July 2004, NTT DoCoMo, one of the biggest and largest mobile company, began the deploying of mobile devices containing FeliCA contact-less Chip developed by Sony.

The superiority of the chip being in its capability to maintain multiple forms of data including personal identification, Bank account number , Balances , Credit information, transit passes and more. NTT DoCoMo phones enable the consumer to use their devices as a substitute of cash and cards at vending machines and merchant's point of sale.

Later in 2005, other two mobile companies KDDI and Vodafone also adopted the FeliCA chip.

Various Business have developed Platforms that acceptance of mobile proximity payments. Mobile Carrier NTT DoCoMo developed its own called Id. East Japan Railways developed the Mobile Suica Platform.

There were other prepaid products launched by various companies were Edy, Mobile Suica and nanco allowed the consumer to fun their account with cash. The First two products Edy and Mobile Suica also allow funding via credit card or Internet/Mobile Banking accounts.

Mobile payments in South Korea

South Korea was the first to introduce mobile payments even before Japan in late 2002. The two largest mobile companies SK Telecom and KTF, each launched post –pay mobile proximity payment programs Moneta and K-merce, which were based on infrared Technology. Thou they were not very successful in the market due to various reasons.

Firstly they were inconvenient for the consumer because of scrolling through a several series of handset menu was required to complete the transactions.

Secondly Merchant point of sale readers were not inter-operable with both carrier devices.

Thirdly, the Bankers and Credit Card industries were not very enthusiastic about programs because mobile carriers demanded a relatively large percentage of the card issuer's revenue from a transaction.

Type of Payments

The mobile payments market has been segmented into categories and into a combination of Micro/ Marco and Remote/Local mobile payments.

Mobile remote payment

Remote payments form a part of those payments that actually take place on an online environment, where-in the mobile phone is used as a device to authenticate personal information stored remotely.

Remote Payments are classified into:-

Lower Value Purchases (LVP)

LVP includes mobile content or ring tones, for which mobile operators have already developed solutions based on the phone number (MSISDN) for user authentication. Such transactions are recorded on the user's mobile phone bill and the merchant will be reimbursed by the mobile operator later (mutually decided payment cycle between the merchant and mobile operator). This method of billing is called as billing-on-behalf-of', and is mainly used for small transactions, as the level of security is low (network authentication only).

High Value Purchases (HVP)

Mobile payment transaction for HVP can be processed in the following ways:-

Credit/Debit Card - The payment is processed by entering card information on a secured WAP interface.

Wallet / Stored Value Account - In this case the card payment is processed indirectly using a wallet, which stores a user's key information, such as the card number and expiration date, bank account details etc. This is particularly useful for WAP mobile shopping.

Going a step further, a stored value account can be offered to the customer, which can be topped up using traditional payment methods, such as debit cards and credit transfer.

On the security side, which being an important issue is provided by the PIN code for authentication.

Mobile proximity payment (Contact less Payments)

These payments are generally referred to as contact-less payments in which the payment credential is stored in the mobile and is exchanged over the air (OTA), based on NFC (Near Field Communication)technology, with a dedicated and compatible payment terminal.

In such a scenario the mobile acts as a contact-less payment card, thus becoming a new payment form factor.

Contact-less payment can also be used remotely, for example, to make an online purchase by swiping the mobile over a contact-less NFC reader plugged in to the PC.

Technology

Near Field Communication (NFC) is the easy –to –use, short range wireless technology , which forms the crux of contact-less technology which is the basis of the Mobile proximity payment.

NFC is slowly becoming the hot "favourite" Technology for operators, handset manufacturers, credit card companies and public transport operators around the world. It is a combination of contact-less identification and interconnection technologies which facilitates secure short range communication between electronic devices, such as mobile phones, PDAs, computers and payments terminals via a fast and easy wireless connection.

NFC works in the Frequency range of 13.56 MHz, in excess of a distance of, typically, a few centimeters and combines the functions of a contact-less reader, a contact-less card and peer-to-peer functionality on a single chip.

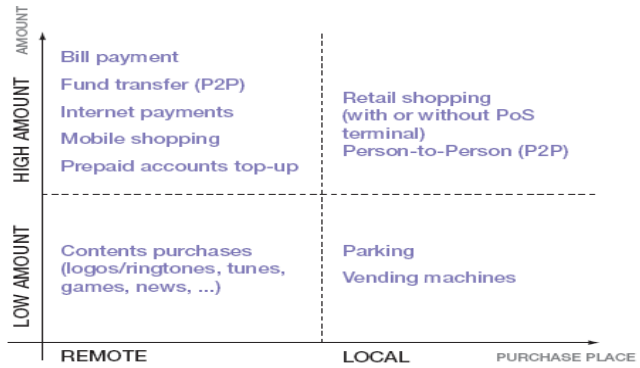
Future Outlook

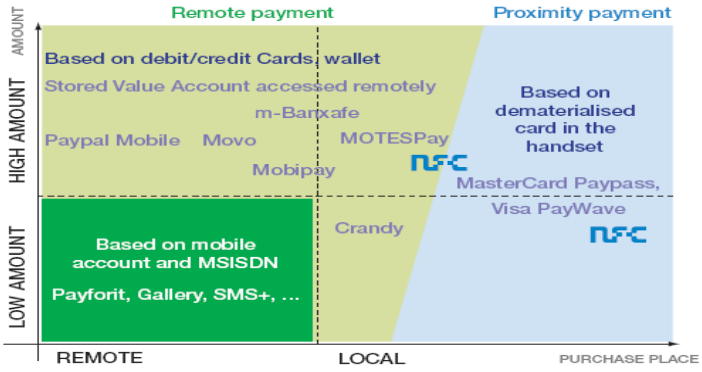
In the present day scenario, one would find in most wallets and purses are credit and debit cards, that to all from different issuers with their own brands and logos. But the future will hold something different, it shall be a mobile phone which shall become a

highly sophisticated a wallet, on which the customers shall be able to store several dematerialised eCards from different issuers with their own brand and logos.

Apart from the E-cards into the handset, it also enhances the customer's experience by adding interactivity via a screen and a keypad.

Moreover, it gives access to related online services, reached via the mobile data network (GPRS/UMTS, SMS/MMS), and through mobile specific functions, such as geo-location.





** Source: - Whitepaper on Breakthrough in the European Mobile Payment Market

Industry perspective on m-payments

Many companies across various sectors have adopted and have participated in different type of m-payments. The retail industry has driven the m-wallet application, whereas the transport industry is the leader in contact-less or touch-and-pay solutions.

Mobile payments business type by industry

	m-wallet	m-banking	Touch-and-pay	Top-up	Remit	Content	Payment gateway	Auctions
Telecom	◐		◔	◕	◐	◕	◔	
Banking	◔	◕	◔		◔		◔	
Retail	●		◐		◐	◐	◐	◕
Transportation	◐		●		◔		◔	
Media	◐			◕	◔	●	●	
Verticals[21]	◕		◕			◔	◔	◐

Level of payments adoption by industry ● Leading ◕ High ◐ Emerging ◔ Low

Source: TRPC

Each of these types of m-payments has different set of value chains.

Telecom

In the case of the telecom industry, the main approach to m-payments is based on two basic principles: **Increasing user and Increasing revenue** per user.

Increasing user's means to increase the customer base as well as customer loyalty, in order to support stable revenues from conventional telephone services. Where-as in the case of Increasing revenue means increasing the amount of traffic per user and volumes of premium- priced digital content.

M-Wallet The development of the carrier driven mobile wallet market is still relatively small, since majority of applications are based on SMS, but in the near future it hold a great potential.

Banking

Mobile banking Majority of the development has been till now around simple facilities like account enquiries or transfer of funds. The major untapped potential lies in capturing the "un-banked market", increasing the level of consumption at the point of sale and extending the opportunities for accessing credit.

Retail

M-payments are about widening the opportunities for payments, particular mini and micro payments, while mitigating risk and capital expenditure. The two areas of concern for the industry being

a) The need to pay for and to integrate, hardware such as card and chip reader
b) Speed of the transactions

Transportation

Touch and Pay The transportation industry has been one of biggest driver's of smartcards. These smart cards have actually increased convenience, reduced transaction time and have integrated transport offerings, particularly public transport.

M-Wallet Most countries now support e-tickets with electronic receipts downloaded to the handset sufficing for check-in purposes.

Media and Entertainment

The primary focus is on generation of Revenue from Digital Content.

Content Download

The two main challenges faced by the content Owners/Distributor are

a) Volumes are not large enough to justify the ROI for the infrastructure.
b) The question of how to price the content for download.

Payment Gateway

Payments gateway provides a mean and a model of multi-market distribution without having to interact and deal with telecom carrier market-by-market, nor having to worry about direct billing or chasing down bad debt. Actually this classic combination of content providers (media companies) and third party payment service providers is eventually becoming the most successful drivers of m-payments.

In many of the cases pre-paid top-up are being used to charge for content, particular in developing markets where mobile phone exits but payment is limited to cash.

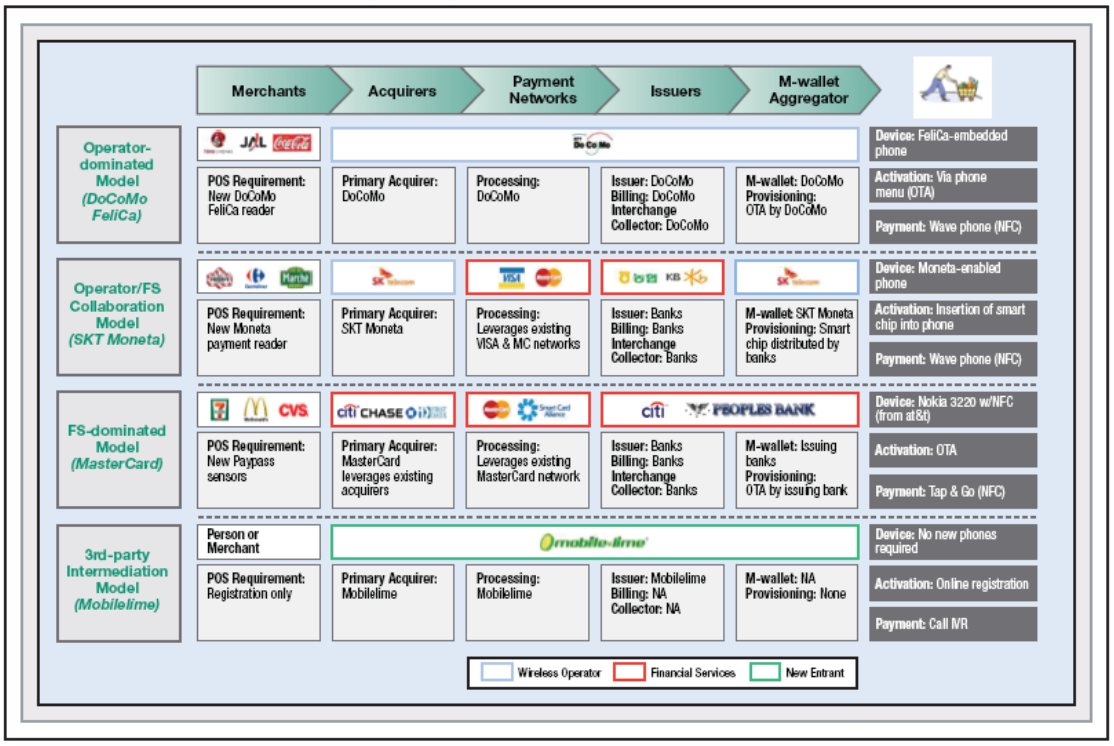
M-Wallet The business model is the same for the Media industry as for the retail in that they negotiate a revenue share with the Telecom Company, for the placement on the telecom company's menu or interface. But the advantage for the media company is usually far greater than for the retail merchant as it is direct revenue and often extends the media company's reach to areas (or countries) they would not otherwise be.

BUSINESS MODELS

The various business models applicable to the mobile payments are in-store purchase and P2P remote payments.

In store Payments Model

Potential Business Models for In-store Payment Segment



To get an overview of this particular model, we shall have a look at the four current initiatives run by NTT DoCoMo (DCM) FeliCa in Japan; SK Telecom Moneta in South Korea; MasterCard m-payment trials in the U.S.; and the Mobilelime venture in the U.S.

NTT DoCoMo FeliCa — Operator-Dominated Model

DoCoMo launched an e-wallet mobile phones using Sony's FeliCa technology in July, 2004 and had some great results. By the year 2006, the company had already more than 24,000 POS readers throughout Japan and over 18 million e-wallet service subscribers (35% of the total subscriber base).

The service works in the following fashion: - The customers get a FeliCa-enabled phone, which comes with an embedded smart chip inside the device. Customers use their handsets to active the service from the two available one: a prepaid account similar to a debit account or an extended credit account.

The users also have a facility to apply for various multiple third-party services such as transit tickets, ID cards, and electronic keys to be incorporated into their e-wallet phones.

Another unique feature available in the DoCoMo model is its vertical integration. It has purchased a bank to handle account management, credit issuance, and merchant acquisition processes. Under this concept DoCoMo has established an end to- end service delivery model (acquisition, payment network, and issuance.)

This model allows gives the operator an amazing flexibility in terms of implementing the payment value chain, specially in establishing attractive processing fees. Since there are no

other players in the value chain, the operator is all , by its own to set appropriate cost of the hand sets and reduce transaction fees to entice new merchants.

This model has it share of disadvantages also, since going alone, apart from the initial cost of acquiring a bank with credit-issuing capability; it also had to invest in the acquisition of new merchants and distributing new POS readers throughout Japan.

Going forward if the same model is to be applied in the US Market would be a greater challenge since there is not a single dominating operator.

SK Telecom Moneta—Operator and FS Collaboration Model

The model was originally trialed in South Korea in 2002 using infra-red readers; SKT Moneta presently uses a NFC chip inserted into mobile phones to facilitate payments.

Visa and SKT had also announced plans to offer Universal SIM (USIM) cards, which could be personalized over-the-air (OTA) starting in 2007. The service has over 500,000 POS readers and 2.6 million subscribers with Moneta phones.

The customers initially sign up for the SKT Moneta service via the web or through their local bank branch. Later on the customers will received a personalized chip that they need to insert into the phone to activate the service. Once activated, the handset can be used as an e-money account, credit card, transit ticket, membership loyalty card, and for mobile online trading.

SKT is the m-wallet, which means that the customers are able to hold multiple accounts from different issuers under one mobile device that is serviced by SKT.

Moneta service exemplifies a perfect tie-up model between a mobile operator and financial services firms. The partnering banks perform the Credit/Account issuance and payments are processed through the existing Visa and MasterCard networks.

For the US Market this model might have a few drawbacks as all credit issuance and account management are being done by the partnering banks and not by the mobile operator, which may be a point of concern for U.S. consumers who always prefer to receive banking services from financial services firms.

MasterCard M-Payments Trial— FS Firm Dominated Model

MasterCard's m-payment trials in Dallas and New York illustrated a financial services dominated Model.

In Dallas, the company tied up with Mobile Virtual Network Operator 7-Eleven Inc.'s Speak Out Wireless and Peoples Bank of Paris Texas, where for the New York trials on the similar lines partnered along Cingular and Citibank. Customers received a NFC-enabled Nokia 3220 phone, which was activated OTA using the carrier network in both the trials.

Once the activation was in place , the customer could "tap and go" to pay for goods in more than 32,000 merchant locations that accept Paypass, including CVS, Regal Entertainment Group, McDonald's, 7-Eleven stores, Duane Reade and Sheetz.

The m-payment works on the same principle like the MasterCard Paypass cards in which the customer taps the reader to initiate the payment. Another important aspect being that no signature is required for purchases lower than $25, making it ideal replacement for cash transactions.

This particular model does have some advantages in terms of consumer adoption. Given the fact, that the issuer of the m-wallet is the issuing bank, it works with existing credit accounts and does not require customers to apply for new ones. These trails used MasterCard's existing payment networks and Paypass readers, hence avoided new investments in payment readers or acquisition of new merchants.

Well this model also has a share of its drawback, the operator facilitated the OTA provisioning of the phone via the wireless network, but all the other facets of the payments process were managed and owned by the financial services firms. The operator also does not partake in the interchange fees or own the m-wallet.

In the U.S. operators have a dominant relationship with device manufacturers and heavily subsidize mobile devices, it is unlikely that operators would be satisfied with such a passive role in the value chain.

Mobilelime—3rd Party Intermediation Model

Another approach could be the one applied by Mobilelime's third party intermediation model. The company works to combine marketing and loyalty programs with m-payment service.

The schemes of things were designed keeping in mind the marketing and loyalty programs. Hence SMS were sent by Mobilelime and partnering merchants informing the customer about discounts and other optional promotional information.

To initiate a payment using Mobilelime, customers need to call a 1-800 number and enter a PIN along with a specific vendor location number. The vendor then inserts the last 4 digits of the customer's phone number to receive the payment. After the verification of the payment, Mobilelime transfers the money to the vendor from a pre-registered customer credit card; this is on the same lines as a PayPal online payment. The other facility available to the Merchants is that they can also participate in Mobilelime's marketing and loyalty programs to send promotional information via SMS and track consumer behavior via a customer's phone number.

Another point being that the IVR based payment method does not require any new POS readers at the merchant location or NFC-enabled handsets, which are adoption barriers for other mobile payment methods

However, Mobilelime's payment is not a simple process. Furthermore, Mobilelime presently lacks the brand awareness and marketing muscle to acquire new users and the much needed credibility to acquire merchants in large numbers.

Targeting Remote & Macro Payments

The second type of Business model is the mainly P2P payments type. The three companies selected for the explanation of the same are SMART Money in the Philippines and two mobile services recently launched in the U.S., Obopay and PayPal Mobile

Potential Business Models for the Remote P2P Segment

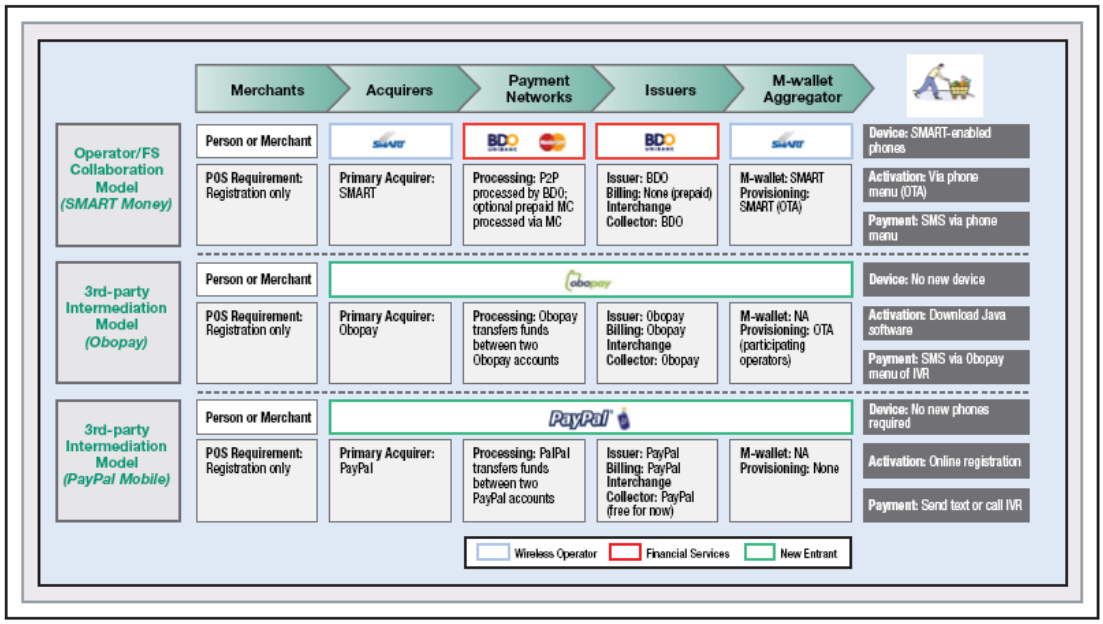


Figure 5

SMART Money—Operator and FS collaboration Model

SMART Money was launched by SMART in 2000 and it was the world's first reloadable e-wallet account. Each SMART handset is shipped with a SMART Money application pre-loaded on its SIM card. Customers can initiate the activation process activate the SMART Money service OTA with the help of the pre-loaded SMART Money menu on the phone.

After the activation has taken place, the customer can use SMART Money to send funds to other subscribers, pay merchants, pay utility bills, and pay for prepaid mobile airtime.

The customers have the facility to reload or deposit cash into their SMART Money account in over 700,000 retail locations, which act as SMART Money reloading stations. In the payment value chain, all the account management and payment processing (except for MasterCard transactions) is done by the partnering bank, Banco De Oro.

SMART takes care of the marketing and acquisition of new merchants and consumers. The company doesn't have a share in the transaction fees, but since the transaction are performed using the SMS, it makes money on the principle of carrier's overall data revenue.

This collaboration model will in the long run surely create a valuable proposition to consumers with an on-the-go P2P service. Ex. Parents can send money to their kids on family plans upon receiving a request for more funds on their accounts;

There is a major limitation in this model that being of "interoperability" between mobile operators allowing P2P transfers between subscribers of different operators.

The prime importance of the "interoperability" is shown by the adoption curve of SMS in the US that only took off after SMS exchanges across operators became available and more reliable. Hence the Mobile operators will collaborate on P2P as well to ensure cross-network transfers.

PayPal Mobile—Third-Party Intermediation Model

PayPal, one of the leading online P2P payment providers with more than 100 million users worldwide, launched a SMS-based mobile payment service in 2006, which allowed U.S. and Canadian members to send money using their mobile phones on-the-go.

The service allows the existing PayPal members can activate their service online by registering their Mobile number along with a PIN and it works with any mobile phone, either via SMS or IVR. Once the customer is registered then the customer can send money by texting the amount to be paid along with the payee's phone number to PayPal or via calling 1-800 number and using the IVR system.

To support SMS requests, PayPal authenticates the transaction by calling back the payer and verifying their PIN, whereas for the IVR requests, the PIN is verified on the initial call. Once the payment is confirmed, PayPal notifies the payee with instructions on how to claim the payment.

The company is also working with merchants and charity organizations to offer "text to buy" and "text to donate" codes.

Obopay—Third-Party Intermediation Model

In March 2006, Obopay launched it's P2P mobile payment service, on the similar lines as PayPal, both payee and payer must necessarily belong to Obopay to send and receive funds.

Also similar to PayPal, Obopay links to a user-provided bank or credit account to replenish account balances when payment is made.

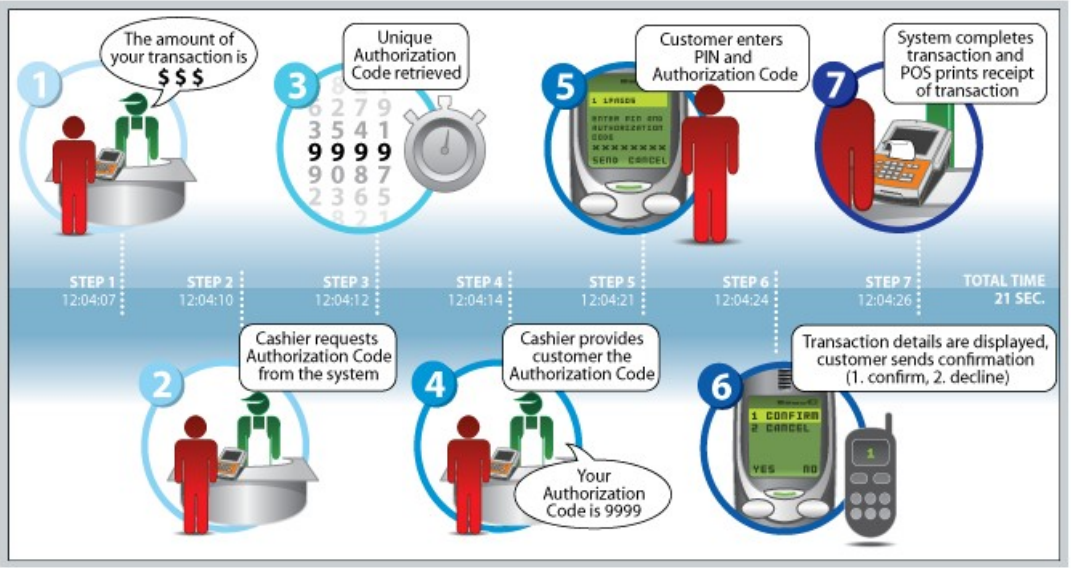
The customer can send money using an Obo-pay application (which can be downloaded OTA for subscribers of select operators), SMS, or via a 1-800 number (IVR).

The receiving party can acknowledge payments and request payment via the same Obo-pay application. Obo-pay shall also provide an optional prepaid MasterCard that can be used with the Obo-pay account to make purchases at MasterCard locations and to get cash at ATMs.

The basic business model is based on the simplified value chain, just like in the case of PayPal, where the accounts for both the payee and payer are held at Obopay and it manages the transfer of funds between the two customers. The customer rely on existing payment networks (credit or debit accounts) to reload their virtual accounts.

The limitation of this model may be, since the third-party intermediation model does not involve the mobile operators directly, the user experience may not be ideal.

Mobile Payment -Transaction Flow



1. The customer is ready to buy the item; the cashier at the counter enters the amount in the POS and requests an authorization code.
2. A unique authorization code is retrieved in real time and given to customer
3. The customer then dials a toll free number from cell phone and is indicated to enter the PIN number followed by the authorization code.
4. After the validation takes place, the customer is asked to confirm the deal or cancel the deal.
5. Once the customer confirms the deal, it received by the POS server and the system completes the transaction and send a receipt to the merchant's POS terminal to print a receipt.

Growth Opportunities for mobile remote payment

Since the Payments can be made at the micro or macro level; each level requires very different set of technology and levels of security.

Mobile Remote Micro-Payment

Micro-payment are that payments which is worth €10 or less for goods and services, such as ring tones and games.

The irony of these payments is that since the amount is less and the merchant's fee for mobile content relatively high.

Presently the mobile operators have accepted the payment risk, based on their basic authentication of the user and their billing systems, without any collaboration with the banks for online authorization.

A typical m-parking scenario would see the customer, upon his/her arrival at the airport, will send a formatted SMS containing his car registration number and the parking area number. This information shall be displayed on the PDA's held with the parking steward.

Upon the receipt of this message the steward can verify if the car is appropriately registered, by typing the car registration number into the PDA.

The customer shall then be billed via the mobile operator, or the user's bank or stored value account is debited.

The various other initiatives available around m-parking; such as easy-park, m-park, park- line and Crandy, which have been developed in collaboration with parking device manufacturers in several cities throughout Europe.

Mobile Remote Marco-Payment

In the case of the remote macro payments, the mobile is in-variably associated to a payment card (credit/debit card) or an account (bank account and/or store account) via an activation/ enrolment process and is used afterwards as an authenticator of remotely-stored information.

The various opportunities for mobile remote macro payments are:

Topping-up a mobile pre-paid account:

Supported with the help of the mobile handset, meaning the customers do not need anymore to go to the shop to purchase a voucher.

For the mobile operators, this is a far less expensive topping up method than scratch cards and represents huge cost savings.

Mobile shopping:

The mobile instrument is used as a shopping and payment channel. The shopping channels shall be based on IVR, SMS or WAP/iMode.

The way to access to the mobile store can be made possible by tag reading, whereby the customer swipes the mobile instrument across a tag (printed on a poster or in a magazine) that automatically links him/her to a website to purchase a product.

There are two different type of tag supported in mobile payments:

Bar code tag –

The customer will scan the bar-code near his favourite product in a magazine, using his mobile phone embedded camera and then will be directed to the related product on the merchant's WAP site, where more information is provided in-order to facilitate the purchase.

NFC tag –

On the same principle as the bar code tag, but the NFC tag is read by the NFC-enabled mobile phone.

In some of the pilot test conducted by European railway companies in which the ticketing applications supported de-materialized tickets be ordered, paid

for and delivered on the mobile. (By MMS containing a bar code or in an NFC-transport application)

Mobile banking:

The option of using the mobile phone to sell/buy stock, conduct credit transfers, check bank balances or pay bills.

Some of the banks in Europe have already started using the GSM channel to conduct banking operations and have meet with some success.

Internet shopping:

The shopping done via the PC, where-in the user can authenticate their transaction via their mobile handset rather than having to enter their credit card details.

Since there are still a quite significant number of consumers that are still not comfortable entering credit cards details online, for whom mobile authentication could turn out to be an acceptable alternative.

In the near future, mobile could be used for authentication of 3D-secure card payments online.

P2P: (person to person)

This is a method to conduct payments between two people via their GSM.

The two models of the P2P are

mPOS:

This service of mobile payments is being sold to the professionals and to low-segment mobile merchants without point-of-sale (POS) payment terminals, for whom mobile payments could turn out to be a cheaper alternative to electronic payment terminals.

The success of P2P on the internet is largely driven by online auctions; the challenge for mobile P2P is to find an equivalent application.

Based on this concept Banks and Telecom companies have decided to address this need of the market by offering a mobile electronic payment solution without any fixed costs being involved. The merchant will have to pay only a fixed fee for each transaction.

The transaction will be initiated by the merchant via a SIM toolkit menu entry in his mobile device, entering the amount due and the customer's phone or reference number. The customer will then receive a signature request on his/her mobile handset and shall validate it by entering his/her PIN. Both the parties (merchant and customer) receive a confirmation of the transaction via SMS.

The whole transaction is done by debiting the customer's bank card and crediting the merchant account, while payment costs – including communication costs – are billed by the telecom operators using the SMS premium infrastructure.

This concept having another advantage being that the acquiring process for merchants wishing to take advantage of this solution is relatively simple – no paper contract, quick and free registration via the Internet – to ensure operational resources are minimised.

This mobile solution is ideal one especially, for small businesses and independent operators (doctors, dentists, architects, accountants, plumbers, electricians, delivery companies, taxi drivers etc).

International fund transfer

One of the most promising applications of P2P Mobile payment services with the specialized feature of sending money abroad.

There are around 191 million migrant workers in the world and with the business potential of international funds transfer to be of 257 billion USD in 2005 (according to the UN and the World Bank respectively), it's one of the big opportunity and emerging market for the telecom operators and banks in the near future, which need's to be exploited.

It will be also an additional opportunity for mobile operators to bring financial services into various developing countries, where the number of 'unbanked' (or underbanked') people with mobile phones is much higher in comparison to the banked population.

Conclusion

The future of the mobile payments looks very bright as we enter the age of the Apple i-Phone and other similar devices; it is evidently becoming clear that mobile phones shall have the ability to operate as small-scale computers.

Although some mobile payment platform, have a basic need of specific software and NFC chips carry a quite substantial amount of Data. Moreover, due to the technology advancements with new innovations such as WiMAX, will make Internet connections through mobile devices will be at an improved speed and more easily accessible.

The rise of mobile payments in on the horizon as it's unique ability to integrate payments, banking and real time two way data transmission. This rule does-not apply to the cash, checks or cards.

Another factor being the payment providers will have to capitalize on the information sharing capabilities of mobile and chip based payments, which are not available with the paper or magnetic strip payments.

It is important to note that presently mobile phone could be the most apparent initial channel for large-scale adoption of a new payments infrastructure, but it may not be the only channel— unless the infrastructure that is eventually built is specific to one form of payment.

Looking ahead, a new payments evolution may be realized by a nexus of networks, financial institutions, and technology providers that will be safe, reliable, convenient, and ubiquitous chip-based payment platform— be it via a mobile phone, RFID tag, Contact-less card, or another, as yet unforeseen, payment instrument.