GSMA ASSOCIATION

MMT: Catalysing the Mobile Money Market







Strictly confidential, not for release to third parties without prior written GSM Association authorisation. Property of and © GSM Association 2007. All information is provided "as is" without guarantee of accuracy, completeness or currency. This document is for information only and does not constitute legal or regulatory advice. The recipient is advised to obtain his own independent advice in relation to the subject matter.

MMT: Catalysing the Mobile Money Market

Contents

1. Executive Summary Page 4

2. The Critical Role of Remittances Page 6
   - 2.1 Global analysis

3. The Mobile Market Opportunity Page 9
   - 3.1 Access
   - 3.2 Cost
   - 3.3 Mobile as the Key Enabler

4. GSMA MMT Programme Page 13
   - 4.1 Objectives
   - 4.2 Principles
   - 4.3 MMT as a Mobile Money Market Catalyst
   - 4.4 Stakeholder Engagement

5. MMT Use Cases Page 16
   - 5.1 mWallet to mWallet
   - 5.2 mWallet to Cash
   - 5.3 Cash to mWallet

6. The Route to Interoperability Page 18

7. The Operator's Role in the Value Chain Page 20
   - 7.1 Bearer Channel Only
   - 7.2 Bearer Channel and Application Development
   - 7.3 Bank Integration and MNO with a Mobile Banking Hub
   - 7.4 MNO as a Financial Institution
   - 7.5 Operator Value – direct vs indirect
   - 7.6 Regulatory Framework

8. Call To Action – How to Get Involved Page 24

Appendix: Page 25

- mWallet Implementation Options Page 25
- Vendor Analysis Page 28
- Definitions Page 37

1. Executive Summary

The GSMA is spearheading the Mobile Money Transfer (MMT) initiative that will utilise the benefits of GSM technology to improve access to money transfers for a much wider section of the global community.

With close to 5 billion people around the world with little or no access to traditional financial services – due to a lack of ATMs and bank branches, poor regulation, low levels of financial literacy or other weaknesses in infrastructure – many migrant workers find it difficult to transfer money to their un-banked dependents. Even today, the primary concerns such as security, cost and accessibility while transferring money remain unsatisfied.

More than 3 billion people around the world make use of mobile phones. This huge addressable market, combined with the lack of a uniform system for mobile remittances, prompted the GSMA to launch a programme that seeks to tap the ubiquity and ease-of-use of mobile communications to enable the world's some 200 million international migrant workers to easily and securely send remittances to their dependents, many of whom don't have bank accounts.

The objectives of the MMT programme are to exploit the extensive reach of the mobile networks, complement the existing local remittance channels and make transferring money internationally significantly more affordable. Any MMT service should satisfy the following requirements:

- Provide a clear role for the operator
- Be interoperable
- Provide low cost to the user
- Be secure
- Provide transparency of pricing
- Allow global reach and scalability
- Implementable with minimal change to existing infrastructure
- Be low cost to deploy
- Ensure acceptable speed of money transfer

MMT: Catalysing the Mobile Money Market

As the leading trade association for the mobile telecoms industry, it is the GSMA's task to deal with overarching issues of interest for the mobile community as a whole, such as developing new technology enabling interoperable solutions to the benefit of operators, as well as consumers, without distorting competition between operator members.

The ultimate objective of the GSMA's MMT initiative is to enable a broad and interoperable solution for money transfer. Theoretically a wholesale remittance provider could work directly with an operator without any intervention from the GSMA. In practise, however, the MMT initiative would support a faster implementation of the services on a much broader base and hence bring this new service to the global market faster, ultimately benefiting consumers as well as the operator community. Interoperable and global solutions – which could only be developed on an industry level – are therefore key to the broad success of this project.

Mobile remittances represent a significant opportunity to catalyse the mobile financial services market across the mass market of consumers in both developed and developing economies. The creation of a new global market of affordable low denomination mobile remittances will drive acquisition of mobile wallets by consumers and be an important source of funds for them. Mobile remittances require the same enabling infrastructure at a local level (mwallets) that is required for mobile financial services as a whole. However, by itself remittances are not sufficient for a successful mwallet roll out. MNO's and banks must capitalise on the interest, established consumer behaviour, customer acquisition and funds realised through remittances, by building a range of compelling domestic mobile financial services.

This paper provides an overview of the GSMA's MMT programme, and defines the role of the various players in the value chain. In particular, it aims to highlight the leading role of the operator community and the potential for MMT to help catalyse growth of broader m-banking and m-commerce services.

By partnering with operators, vendors, local governments and other organisations in the financial services sector, the MMT programme is at the forefront of global developments in the mobile money value chain and further enhances the role of GSM technology in bridging the digital divide and expanding the portfolio of services offered across mobile networks to millions of people across the globe.

2. The Critical Role of Remittances

Millions of people in developing markets are dependent upon the support of primary wage earners often working far from home in cities and abroad where work opportunities are concentrated. In Asia this phenomenon is well established with countries like the Philippines having a high proportion of GDP dependent upon international workers. More recently the extension of the European Union has seen an increase in workers from Eastern Europe travelling to and working in countries such as Germany, France and the UK, as well as the Nordic bloc. Similarly, significant numbers of people from West Africa are resident and working in Europe and the US.

The flow of funds from migrant workers back to their families in their home country is an important source of income in many developing economies. The recipients often depend on remittances to cover day-to-day living expenses, to provide a cushion against emergencies or, in some cases, as funds for making small investments.

For recipient nations, these funds form an important source of national income, in many cases exceeding the country's income from Foreign Direct Investment and International Aid donations. Remittances now account for about a third of total global external finance[1].

Most migrant workers send home between US$2,000 and US$5,000 a year – or 20 to 30 percent of their earnings[2]. The total value of remittances has been increasing steadily over the past decade and it is conservatively estimated that in 2004 the total value worldwide was over US$230 billion. This value is based on 'formal' remittance channels that are tracked and recorded. In light of the fact that informal channels also exist, this figure is estimated to be approximately half the total amount remitted, giving a possible total market of over $500 billion.

Some 175 million migrants currently use remittance services, sending money to a dependent recipient base of around 800 million people. The World Bank estimates an average transaction value of $200.

International remittances are estimated to be larger than aid and foreign direct investment

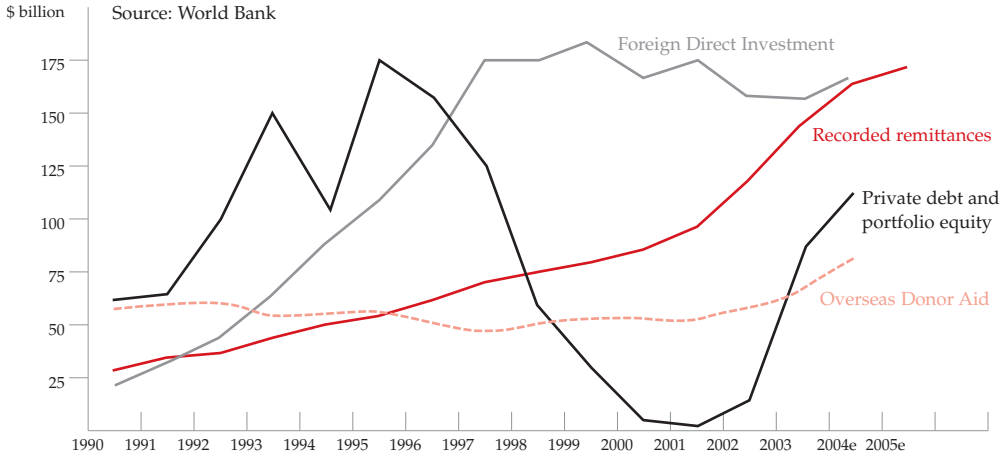


Figure 1

[1] Source: World Bank – March 2006
[2] ID21 Insights

For some countries, remittances can contribute to a significant proportion of GDP, up to a third in some instances.

Remittances as proportion of GDP 1992-2001

Source: World Bank

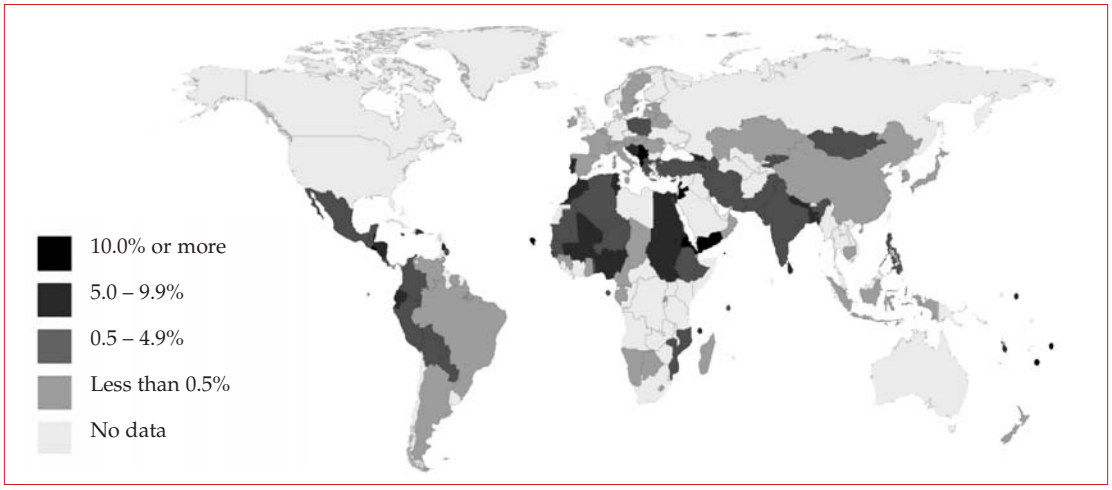


Figure 2

The chart below displays the world's top twenty countries where remittances contribute a significant percentage of that nation's GDP.

Remittances as a share of GDP

Source: World Bank, GEP 2006

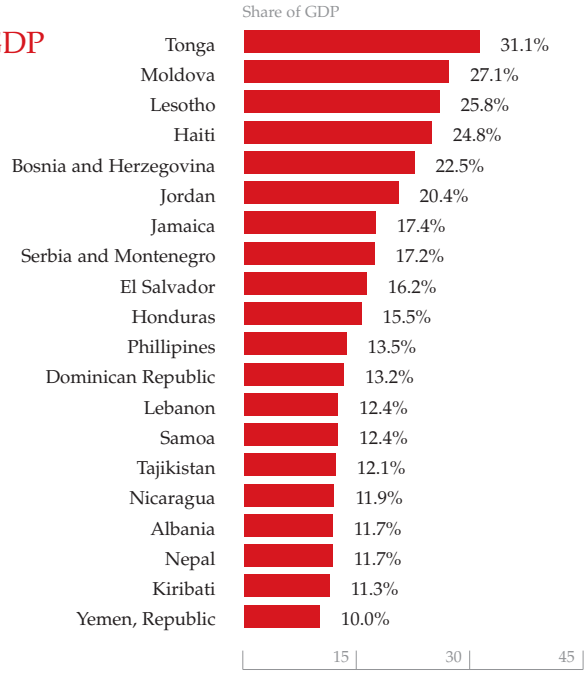


Figure 3

2.1 Global analysis

India is the largest recipient of remittances from workers based abroad, followed by China, Mexico, France and the Philippines. Based on GSMA analysis, the top 10 receiving countries represent 45% of the global remittance market.

Top receivers of remittances

	RECEIVING COUNTRY	Remittance Value ($bn)	Remittance Worker Abroad ($)
1	India	21.7	$937
2	China	21.3	$930
3	Mexico	18.1	$969
4	France	12.7	$730
5	Phillippines	11.6	$1,091
6	Indonesia	5.2	$2,137
7	Brazil	5.0	$979
8	Pakistan	4.0	$765
9	Morocco	3.6	$1,133
10	Bangladesh	4.8	$544
11	Portugal	3.2	$897
12	Russia	2.9	$285
13	Egypt	2.9	$1,915
14	Turkey	2.8	$743
15	Nigeria	2.8	$170
16	Serbia	2.4	
17	Columbia	2.4	$641
18	Dominican Rep.	1.9	
19	El Salvador	1.9	$956
20	Jordan	1.9	
24	Sri Lanka	1.3	
31	Malaysia	1.0	$365
31	Nicaragua	1.0	$956
32	Ukraine	0.8	$266
	Others	94.9	
		AVERAGE	$870

Figure 4

Source: OECD, 2000 and GSMA analysis

For individuals in developing countries, access to remittance funds has the potential to bring profound change to their own lives, and to the social and economic growth of their communities. For receiving countries, such funds have huge economic and social benefits on a national scale. The ability to move money using the mobile phone will have dramatic and positive benefits on the dynamics of economies with traders being able to communicate and do business more easily across whole regions.

Looking ahead, favourable trends in global migration will ensure that the amount of remittances will continue to grow dramatically. According to Western Union, the global migrant population is expected to grow from 191 million in 2005 to more than 280 million in 2050, with China, India, Mexico and the Philippines experiencing strong levels of emigration. It is estimated that the total value of global remittances in the next five years will be US$700 billion.

Such developments have already led a World Bank report to state that ‘improvements to payment system infrastructure that have the potential to increase the efficiency of remittance services should be encouraged.’

3. The Mobile Market Opportunity

As demonstrated in the previous chapter, the remittance market is a huge and expanding industry sector.

Mechanisms for moving cash across borders are well established, including international bank transfers and services offered by such organisations as Western Union, Travelex, Moneygram and Vigo. This market is dominated by a few specialised players.

Estimated Market Share of International Person-to-Person Transfer Providers
(by numbers of transactions processed)

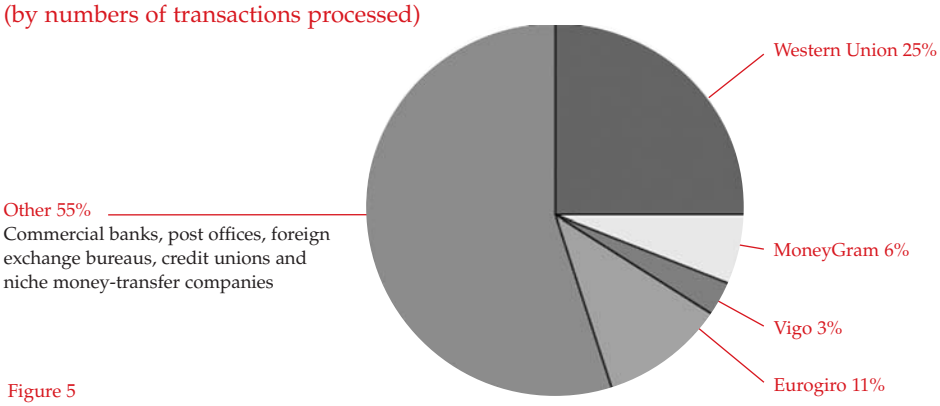


Figure 5

Sources: World Bank Occasional Paper 10 (Ratha, "Workers' Remittances," First Data, SEC Form 10-K; MoneyGram, SEC Form 10; Bezard, Global Money Transfers; Great Hill Partners, "Great Hill Partners Form GMT Group;" private estimates of Gera Voorrips and Hans Boon, ING Postbank; authors' estimates.)

A recent survey conducted by DFID found that the buying needs and purchasing attitudes of customers are based around Access, Security and Cost.

Top factors that influence the choice of provider

Source: DFID/BME Remittance Survey (UK), July 2006

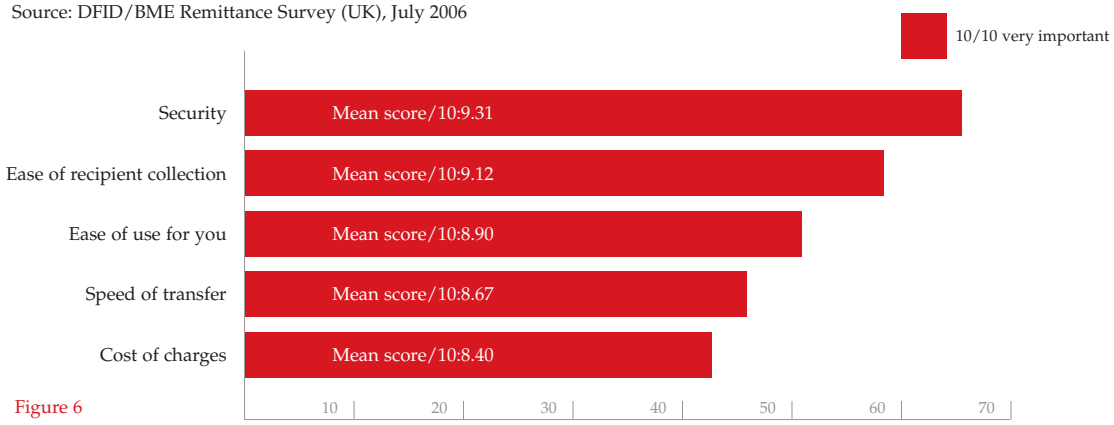


Figure 6

However, there are a number of barriers currently restricting this market from reaching its full potential and from fulfilling the basic consumer needs above.

3.1 Access

Access to the facilities to receive money is often limited, particularly for the poorest people in more rural areas where the banking sector is under represented and a largely cash-based economy exists. There are currently approximately only 0.5 million bank branches globally and only 1.4 million ATMs, compared to almost 3 billion mobile customers worldwide.Those who would benefit most are therefore the least likely to benefit from remittances from migrant workers, locked out of the market through their social, economic and geographical position.

3.2 Cost

A number of mechanisms for cross-border remittances already exist, ranging from international bank transfers, specialist remittance companies and indeed a large 'informal' sector where methods for transferring cash are varied and difficult to quantify. These mechanisms are prohibitively expensive for small denomination transfers, which limit the ability of individual workers to distribute funds to a larger number of people and penalise the poor who can only afford to send small amounts. The informal sector also presents challenges to governments and their agencies.

Due to high overheads (retail premises and staff costs), a high fixed commission cost per remittance means that charges for smaller transactions are high, with industry revenues estimated at an average 15% per transaction, increasing to over 25% for remittances below $100 (including foreign exchange costs, 'FX').

Transfer Costs to Some Leading Recipient Countries[1]

(per cent of amount sent; countries ordered by total remittance inflows)

Sources: Western Union, Women's World Banking, and IMF staff calculations

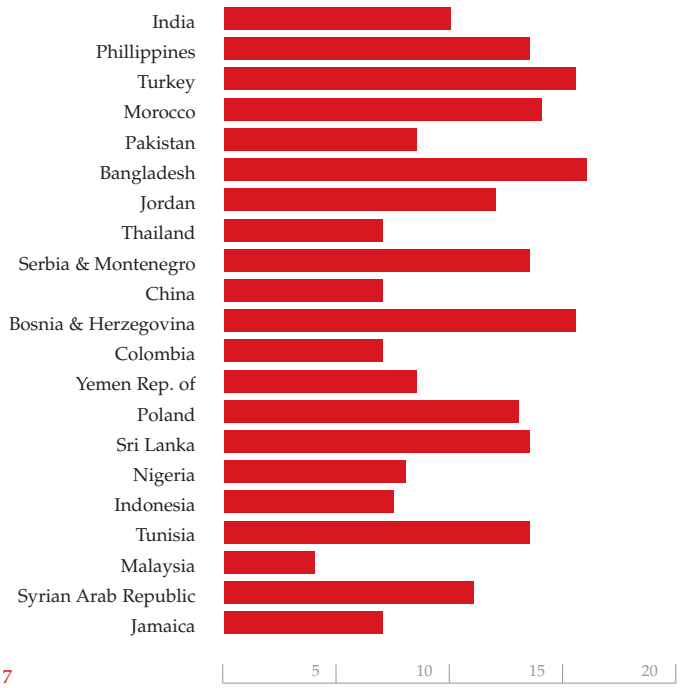
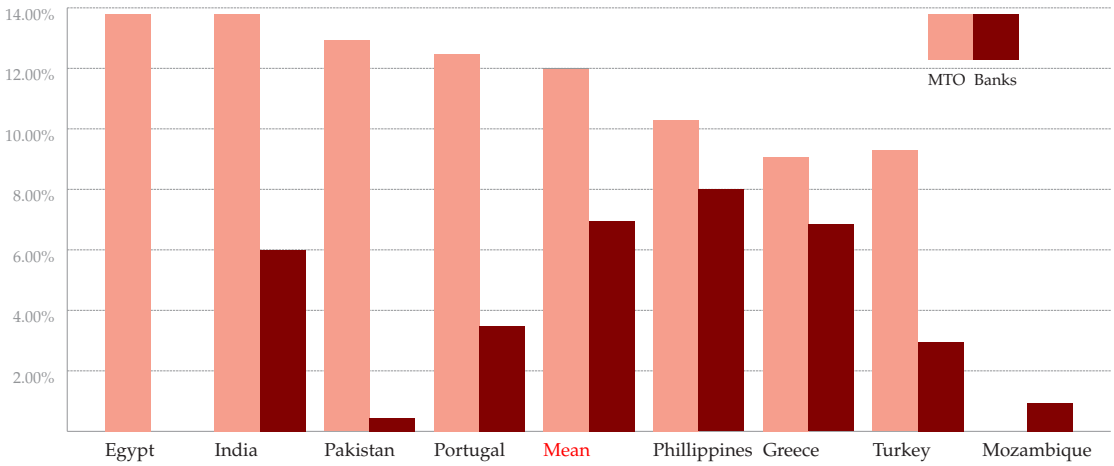


Figure 7

Charges to send $200 to selected countries

Sources: Worker Remittances – An International Comparison, Manuel Orozco, Inter-American Dialogue, 2003

Figure 8



3.3 Mobile as the Key Enabler

With its ubiquity and high penetration in nations around the world, mobile communications now has the potential to vastly improve and transform access to remittance funds for people in developing markets. Mobile technology can lower the cost of remittances as it removes the need for physical points of presence and ensures a timely and secure method of transaction. This concept of 'e-cash' is extremely attractive to low income users in particular. For many communities around the world, access to such funds forms a critical part of their livelihood.

In Pakistan, for example, approximately 12 million people – 7% of the population – live and work overseas, with only 1 million people in Pakistan holding bank accounts. This is in comparison to a mobile subscriber base of approximately 70 million and annual growth of almost 100%. Clearly mobile technology has the potential to significantly increase the use of 'e-cash' in Pakistan and countries around the world.

The role of the mobile operator community is critical to the success of mobile remittance services. Mobile operators have a level of reach far outstripping that of money transfer providers and banks. As stated above, there are currently approximately 0.5 million bank branches globally and 1.4 million ATMs, compared to almost 3 billion mobile customers worldwide. With significantly greater reach, Mobile Network Operators (MNOs) can solve the access problem and drive down costs to more acceptable levels.

Left without intervention, mobile money transfers of various forms will continue to proliferate, and product innovation will continue, albeit at different rates and in different directions around the world. Global interoperability, however, would offer significant value to customers and ensure the GSM ecosystem delivers value and scale into this service.

The mobile remittance model must therefore be extended to enable international remittances over mobile in a scalable and sustainable manner and to allow cost effective low denomination remittances – an entirely new market not served today.

The long-term benefits of a unified approach involving MNOs are tremendous. The World Bank estimates that reducing remittance commission charges by 2-5% could increase the flow of formal remittances by 50-70%, boosting local economies. Reducing the cost of sending each individual remittance would encourage the delivery of lower value remittances, at values far less than today's average transfer of US$200.

The GSMA forecasts that the 'formal' global remittance market could be grown from around US$230 billion today to over US$1 trillion in five years with the help of mobile services. MNOs meanwhile would also benefit from increased customer loyalty and network traffic, reduced churn rates, and a share of fees. The potential remittance market addressable by MNOs is a further 2 billion in addition to today's 800 million existing recipients.

The opportunity exists for mobile operators to help grow the remittance market significantly and play a leading role in the sector's development.

4. GSMA MMT Programme

The GSMA is spearheading a Mobile Money Transfer (MMT) initiative that will utilise the benefits of GSM technology to improve access to money transfers for a much wider section of the global community.

Engagement with local governments, operators and other organisations in the financial services sector is providing the opportunity to further enhance the role of GSM technology in bridging the digital divide and expanding the portfolio of services offered across mobile networks to millions of people in numerous countries throughout the world.

4.1 Objectives

The MMT programme has five objectives:

1) Enable millions of typically 'unbanked' poorer migrant workers access to very affordable remittances through the ubiquity, ease of use and scale of the GSM ecosystem

2) Position the operator community as leading the way in helping these poorer migrant workers, and in so doing secure public and governmental recognition

3) Secure appropriate role in remittance value chain for operators

4) Explore opportunities for commercialisation and a global rollout by GSMA members

5) Catalyse the growth of broader m-banking, m-payments and m-commerce

4.2 Principles

These objectives are based on five principles:

- Expand the accessibility of remittances and dramatically lower fees especially for low denomination amounts while enhancing value to operators through share of fees, SMS traffic and customer loyalty
- Address interoperability issues, messaging and financial transfers at an international multilateral 'hub' level, not at a local level
- Partner with global financial players who can facilitate the hub with minimal regulatory or other related concerns
- National distribution and regulatory issues will be handled by operators (and their banking partners), GSMA will provide assistance/guidance as appropriate
- Use of pilot programmes by operators to speed understanding and support

Mobile operators are uniquely positioned to meet the needs of this latent market, with both developed and developing economies offering a potential total direct market revenue opportunity of more than US$100 billion by end 2010, coupled with a significant opportunity for operators to reduce churn.

4.3 MMT as a Mobile Money Market Catalyst

By placing mobile operators at the heart of the programme, the MMT initiative has the potential to catalyse the whole mobile financial services market, incorporating mobile payments, mobile banking and mobile transfers. Mobile remittances may serve as a valuable catalyst of m-commerce and m-banking on a global scale, bringing social and economic development and driving CSR agendas. The enabling infrastructure for 'remote' transactions of mobile payments, banking and transfers has significant synergies.

Structure of the Mobile Financial Services Market

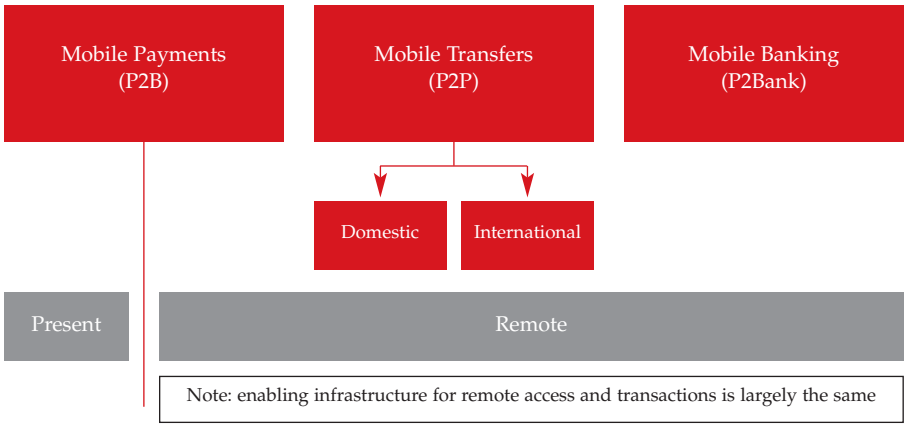


Figure 9

Remittances act as a catalyst in two ways. Firstly, as a driver of wallet acquisition for consumers; consumers receive an alert advising that they have a remittance and need to sign up for a wallet. Secondly, by putting funds in the wallet for use elsewhere.

Taking the example of Pakistan already mentioned, if each of the 7% of migrant worker population from Pakistan send money back to an average of 4-6 people each then very quickly almost half the population will be receiving and using mobile e-money. This critical mass will drive the ecosystem to support the domestic use of these funds for the community receiving them.

Mobile remittances are an important but not sufficient element of successful uptake of e-money and mWallets. To be a compelling consumer proposition there has to be a critical mass of uses of funds from the wallet. The key competitive differentiator for local mWallets will be the combination of cash in and cash out channels and the network of merchants that accept the funds either as mobile payments or with a payment card associated with the mWallet.

Combining m-wallet uses successfully to match consumer behaviour

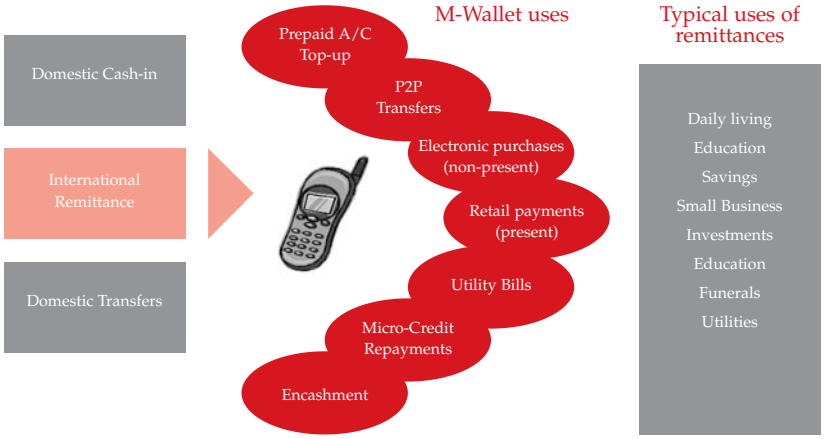


Figure 10

4.4 Stakeholder Engagement

A MNO Steering Committee has been set up to drive and oversee development of the project. The Steering Committee's role is to advise on MNO requirements, sponsor the programme, provide resources as required, actively participate in a pilot programme, and encourage participation from others in the programme. The Steering Committee is Chaired by Sunil Mittal of Bharti Televentures India, which also acts as Board Sponsor. The Deputy Chair is Napoleon Nazareno of Smart Communications in the Philippines. Other Steering Committee members include Vimplecom, Vodafone, MTN, Telenor, Orange and Orascom.

A MMT Working Group has also been assigned, comprised of operators with a potential interest in participating in pilot programmes.

MMT Steering/Working Group

Steering Group

Figure 11

Sunil Mittal (Board Sponsor)

Working Group

TIM	Vodacom	Dialog	Maxis	AT&T	COAI	Telfonica
Telenor	Smart	Vimpelcom	MTN	Grameenphone	Cable & Wireless	Belgacom
Vodafone	Globe	Aktel	Enitel	Zantel	TMN	
Bharti	Turkceli	Orascom	Mobilink	Softbank	Orange	
Swisscom	Digical	MTC Bahrain	Eisaiat	Du	Life	

5. MMT – Use Cases

The utility and consumer proposition of mWallets will vary significantly by geography, socio-economic group of the customer, and the regulatory environment.

In developing economies with a low penetration of bank accounts and relatively poor access to formal financial services, mWallets can act as a mass market, highly accessible alternative to a traditional bank account and access to formal financial services.

In a developed economy, certain consumer groups may also be well served by simple mobile-enabled bank accounts e.g. youth groups and migrant workers. For those with existing bank accounts and payment cards, a mWallet aligned to an existing account or payment card will be more compelling, especially when presence payments (e.g. Near Field Communications applications) become common.

There are three possible use cases in the GSMA MMT Wholesale Remittance Provider Initiative, outlined step-by-step below. Use cases describe the detailed functioning of each of the cases that may arise during remittance. The three generic cases are:

- mWallet to mWallet
- mWallet to Cash
- Cash to mWallet

Note that Cash to Cash is not included here as a use case, as it does not leverage GSM as a channel but rather physical retail outlets. Benefits to the MNO in terms of reduced churn and increased ARPU would be more limited.

In all the following cases it is assumed that local and international licence and regulatory compliance has been implemented, including AML, CFT and KYC regulations.

5.1 mWallet to mWallet

In this case, a consumer with a participating mWallet wishes to send money to a consumer with a participating mWallet in another market.

Each of the consumers would access an in-market MNO remittance service and register their payment instrument into the MNO wallet. The MNO would in turn give the consumer access to the mobile initiated remittance service.

The consumer would access the mobile remittance application on their mobile phone and remit money to a foreign consumer's mobile phone number. The remittance application can be resident on the SIM or a server managed by the MNO and/or their banking partner.

The instruction would be processed by the Payment Service Provider (PSP) to a bank, which would then debit the initiating payment instrument and submit the transaction to the wholesale remittance provider.

The wholesale remittance provider would process the international funds transfer.

The receiving consumer would receive notification on their mobile phone of the incoming remittance and would opt to have it credited into the registered payment instrument.

The receiving PSP would process such credit to the bank and facilitate the transfer of funds to the recipient's account.

5.2 mWallet to Cash

This case involves a consumer with a participating mWallet that houses a payment card or bank account wishing to send money to a consumer without a participating mWallet.

The sending consumer would access an in-market MNO remittance service and register their payment instrument into the MNO wallet. The MNO would in turn give the consumer access to the mobile initiated remittance service.

The consumer would access the mobile remittance application on their mobile phone and remit money to a foreign consumer's mobile phone number. The remittance can be resident on the SIM or a server managed by the MNO and/or their banking partner.

The instruction would be processed by the PSP to a bank who would debit the initiating payment instrument and submit the transaction to the wholesale remittance provider.

The wholesale remittance provider would process the international funds transfer.

The receiving consumer would receive notification on their mobile phone of the incoming remittance and would visit a wholesale remittance provider or MNO outlet in order to receive the remittance amount.

5.3 Cash to mWallet

In this third case, a consumer without an electronic means of payment, such as a payment card or bank account, wished to send money to a consumer with a participating mWallet which houses an electronic means of receiving payment such as a payment card or bank account.

The consumer would visit a wholesale remittance provider or participating MNO outlet and process a cash-in transaction and remit funds to a consumer using their mobile phone.

The wholesale remittance provider would process the international funds transfer.

The receiving consumer would receive notification on their mobile phone of the incoming remittance and would opt to have it credited into the registered payment instrument.

The receiving PSP would process such credit to the bank and facilitate the transfer of funds to the recipient's account.

6. The Route to Interoperability

Critical to the principles of the GSMA's MMT programme is a multilateral – or 'networked' – hubbing approach between different operator networks and other members of the value chain. This approach is in comparison to traditional mobile remittance applications whereby different parties have to establish bilateral relationships with each new interworking partner.

As outlined in the diagram below, bilateral models have a high potential to restrict the economic and consumer proposition of a mobile remittance application and hinder overall mobile industry growth. A lack of ubiquity inhibits consumer takeup and the overall customer base available to model participants, thereby affecting the economics of the model.

Multilateral models reduce the time and resources needed from an operator as each operator only needs to connect once to the hub before becoming able to send a remittance to any mobile phone user in the world without any additional negotiation or agreement. This, in turn, drives consumer uptake. Multilateral models are also able to generate significant economies of scale.

Interoperability and market momentum

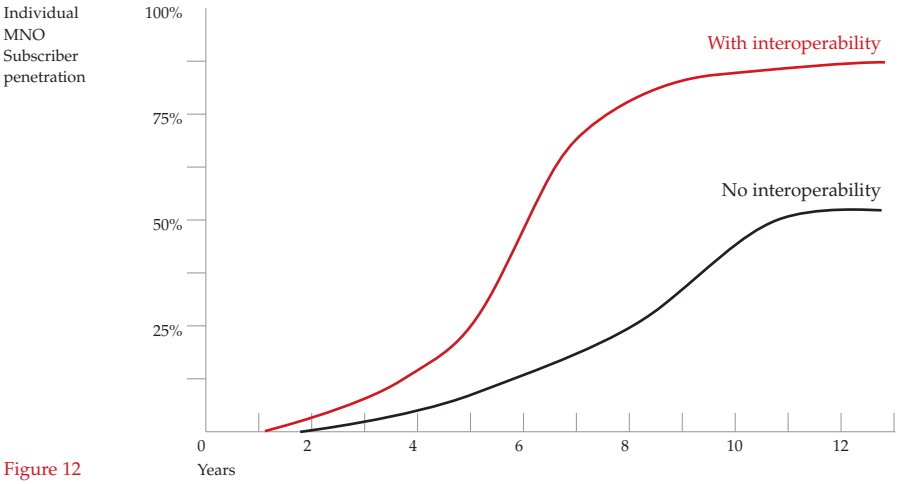


Figure 12

The GSMA's MMT programme believes that a multilateral, or networked, approach is necessary to ensure a maximum number of players can interconnect with each other. In turn this will accelerate the market for mobile remittances and utilise the scale and ubiquity of mobile technology.

The MMT programme has identified 4 major routes to delivering a multilateral hub capability:

- Global processing companies e.g. Mastercard, Visa, which would use the PAN (Primary Account Number) as a primary routing mechanism with translation to the MSISDN
- Wholesale bank e.g. Citigroup, HSBC, which would use the MSISDN as a primary routing system
- Wholesale switch e.g. Western Union, MoneyGram, which would use the MSISDN as a primary routing system
- New Co's e.g. G Exchange, Smart Services Hub, which would use either the PAN as a primary routing mechanism with translation to the MSISDN or the MSISDN as a primary routing system

The benefits and drawbacks of each of the four options are highlighted below:

Pros and cons

Figure 13

Model	Description	Pros	Cons
Global Processing Co.	Service provider using global switching, clearing and settlement capabilities to mobilise card to card transfers. Virtual PAN's and pre-pay cards used for un-banked	• Robust, global, secure and compliant solution • Existing platform and rules • High service feature set and consumer brand trust • Helps bank the unbanked and drives mpayments	• Slow – complex, inflexible conservative organisations reliant on local bank support • Routing on PAN not MSIDSN • Heavily regulated and complex value chain • Ability to serve unregistered customers not clear
Wholesale bank switch	Bank or other FI uses own wholesale remittance platform to switch, clear and settle remittances from a variety of first and last mile service providers	• Robust global, secure and compliant solution • Should be flexible e.g. ability to collect funds and pay into a number of alternative suppliers	• New business being established • Potential to conflict with retail and corporate business • Appropriate licences may not be in place in all countries • Complex business model, reliance on local FI's
Wholesale switch	Established remittance providers wholesaling their technology platform and infrastructure for m-wallet to m-wallet transactions	• Speed to market – utilises existing remittance capabilities and potential retail channels • Simple value chain	• Not aligned to established banking infrastructure – impact on ability to catalyse payments and banking the un-banked • Potential to cannibalise existing business may inhibit flexibility of solution • Limited product feature set
New Co.	Companies creating their own proprietary switching, clearing and settlement hubs	• Typically MNO centric • Small companies and flexible	• Growing businesses with limited existing resources and customer bases • Significant proportion are MNO owned which may create some competitive dynamics

The aim of the MMT programme is to drive the involvement of all the financial service providers listed above and each deployment option, in order that operators can facilitate global reach and the concept of a multilateral hub model can fulfil its potential. All providers can play a role as they each support different approaches and have different geographical presence. The MMT programme could see an MNO using all approaches so that the maximum customer base can be served, with integration occurring at the level of the account controlled by the MNO/bank.

7. The Operator's Role in the Value Chain



	MNO as Bearer 1	MNO as Application 2	MNO/Bank Joint venture 3	MNO as Financial Institution 4
Churn reduction	No reduction in Churn as any MNO can offer the service	Reduction in Churn	Definite reduction in Churn	Definite reduction in Churn
Regulatory and Licence Constraints	No impact	Low impact. PCI compliance	Banks typically facilitate regulatory compliance	High regulatory and licence requirements
Brand	Not used	Not used	MNO Brand	MNO Brand
Banking Systems	None required	Financial Switching only	Some required	High infrastructure requirement
Distribution Chain for cash handling etc.	Not used	Not used	MNO and Bank	MNO only
Transactional Risk	None	Some	Half of the risk	All of the risk
Cost Revenue	Marginal Low	Some cost Good	High cost High	Very high costs High

Figure 14

7.1 Bearer Channel Only

Low MNO impact/involvement where a MNO only supports the bearer channel or normal consumer voice/data usage and the mobile banking application is built away from the MNO and does not require the MNO for provisioning or support. An example of this would be a JAVA application built by a vendor, where the download of the application is dependent on the network supporting packet data access (eg. GPRS or EDGE) but not necessarily facilitated by the MNO.

This environment fosters an easy consumer churn as there is no lock-in to the MNO and no benefit to the MNO over any other network in the market. It is a fairly network agnostic environment.

7.2 Bearer Channel and Application Development

An example of fairly low network involvement is where the MNO is required to complete some of the application development due to the bearer channel supported. An example of this would be where the vendor/bank makes use of the MNO's hosted USSD2 gateway or IVR platform in the provisioning of the service. There is a dependency on the network to develop the USSD2 menus or the IVR voice flows. This environment assists in creating value for the MNO in the service offering, but is not much of a competitive differentiator as most MNOs would be able to offer similar solutions.

SIM Application Provisioning

This requires a large amount of MNO involvement, but results in ownership of the application residing on the SIM, which is MNO real estate.

This adds value to the consumer's SIM and assists in prevention of Churn and perceived value from the MNO to the consumer.

The MNO would need the application embedded in the SIM prior to shipping and/or have OTA technology in place to get the application onto the SIM. The MNO would also need data encryption on the SIM and integration into a financial institution for the processing of transactions.

7.3 Bank Integration and MNO with a Mobile Banking Hub

An example of fairly high levels of integration and network involvement is where the network operator would facilitate the implementation of a Mobile Banking platform or Hub and offer the solution in a hosted environment to the banks in market.

This would require integration into the banks, customer data repositories, financial switches, etc. The solution would also require auditing and certification.

This requires a high level of MNO involvement and also control over the application.

This option gives value to the banks and to the MNO consumers and thus preventing churn and generating new revenue streams.

7.4 MNO as a Financial Institution

This is the highest level of MNO involvement in Mobile Banking or commerce. Where the MNO enters into a joint venture with a bank or obtains a licence to be a financial institution (eg. e-money institution, bank or payment services provider).

The MNO would own the entire value chain. This would be resource and technology heavy and will take time to implement. This level of involvement would require Banking hosts, switches, customer management systems, bearer channel development, audit trails, reporting; etc.

It would add value to the consumer but may not be core to the networks business.

Of the above models, options 2 and 3 are more favourable to the MNO.

Value Proposition for Investors and Banks

MNO	Bank
• New Customer Acquisition – Individual – Corporates • Non-traditional Telco revenues – Transaction fees – Share of Forex Spread – Finders/consumer sign-up fee – Future m-banking revenues eg. utility Bill Payments • Increase in ARPU • Reduced churn (eg. one MNO reduced churn from 3% to 0.5% per month) • Meets government service obligations and CSR agendas • Opportunity to up-sell – Mobile Content – Prepaid to Post Paid	• Increase banking penetration/untapped market at low acquisition cost • Increased 'stickiness' for current customers • Reduce operational costs through straight through processing • Meets government service obligations • Productises their remittance service • Opportunity to up-sell remittance to banking products – Mortgage/Loans – Insurances – Pensions • Potential revenue streams – Retention of deposits – Increased transaction nd FX spread revenues

Figure 15

What each party brings

Mobile Operators	Banks
• Untapped customer base (un-banked, prepaid, immigrants) • Corporate customers (also kiosks at large construction sites; Bundled Package) • Customer registration for mobile component (link account to mobile) • Strong Branding • Mobile application and First mile automation • Support/cust. care for mobile applications • GSM network • Retail outlets and top-up points of presence	• Banking infrastructure (card mgmt etc) • Retail outlets • Regulatory compliance, regulator comfort • Regulator reporting • Bank accounts for consumer and ensure KYC for bank accounts • Connection to MCW • Facilitate Forex, clearing and settlement • Provide cash in/out facility

Figure 16

7.5 Operator Value – direct vs indirect

There are two sources of value to the operator; direct and indirect. Direct value is generated from transaction fees and increased telecoms usage to support the service. Indirect value comes from increased usage not directly linked to the service but catalysed by it, for example calls to advise customers that funds are being sent, or from reduced churn. In particular, one MNO has already experienced up to 80% reduction in churn from those consumers using a mobile wallet.

7.6 Regulatory Framework

MNOs introducing mobile money transfers face regulatory constraints with regard to financial regulation.

The GSMA has published a regulatory report compiling and explaining these regulatory hurdles. Depending on the business model chosen, the regulatory issues facing the MNO will be different. The regulatory information in this report is relevant for a wide range of business models. For more information on the report please contact the author, Marina Solin (msolin@gsm.org).

The MMT programme focuses on minimising regulatory issues by partnering with global financial players who carry most of the regulatory burden. However, in the long-term, anti-money laundering (AML)/Combating the financing of terrorism (CFT) legislation agency rules for banks and e-money and payment regulation impact the ability of MNOs to offer mobile transfer services in an easy-to-use way. Regulation also has an impact on the ability of the MNO to reach unbanked consumers.

8. Call To Action – How to Get Involved

The GSMA's MMT programme features a number of workstreams and projects open to operator, bank and vendor involvement:

- Hubbing models and MMT pilots
- Vendor Partner Programme
- Regulatory Studies
- Conference seminars
- MMT Service Mark
- Stakeholder Engagement

As the reach and influence of the MMT programme is expanding, we are open to partnerships that harness the vast potential of mobile communications to aid the remittance market. For more information, please contact Ben Soppitt, MMT Programme Director, at the address below:

Ben Soppitt
MMT Programme Director
1st Floor Mid City Place
71 High Holborn
London WC1V 6EA

Tel: +44 (0) 7944 816065
Email: bsoppitt@gsm.org

Appendix

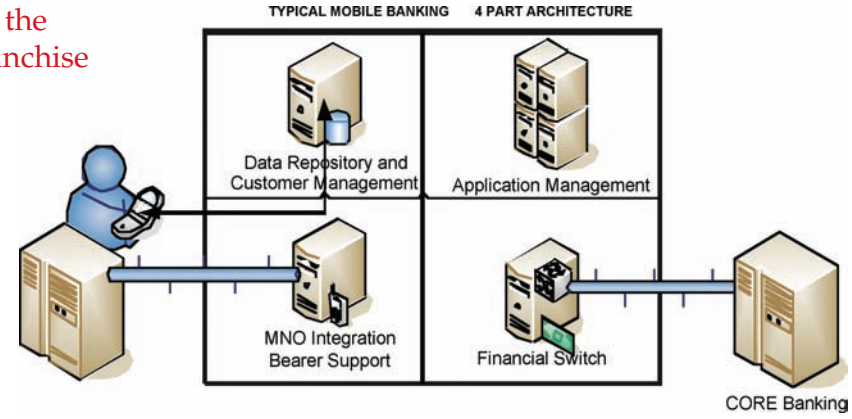
The diagrams and content within this chapter are an adaptation of certain sections of the FinMark Trust Mobile Banking Technology Options Paper (G.Krugel, August 2007), reproduced with kind permission of FinMark Trust (www.finmarktrust.org.za).

mWallet Implementation Options

There were three implementation options identified in the FinMark Trust Mobile Banking Technology Options Paper (Gavin Krugel, August 2007). The following section is an adaptation of these options from the perspective of a MNO led implementation.

Architecture of a platform for the extension of the Banks payments franchise to Mobile

1. MNO Bank Joint Venture: MNO Brand and Distribution with Bank Infrastructure



This diagram shows a Bank and MNO joint venture that uses the banks existing core banking system and the implementation of a mobile banking platform to deliver Mobile Banking to the consumer.

The MNO would develop a MNO bank brand and marketing campaign and leverage its distribution channels to market the new MNO branded bank product as a value added service to its existing and new consumer base. The distribution chain would be used as a sales point for the new accounts.

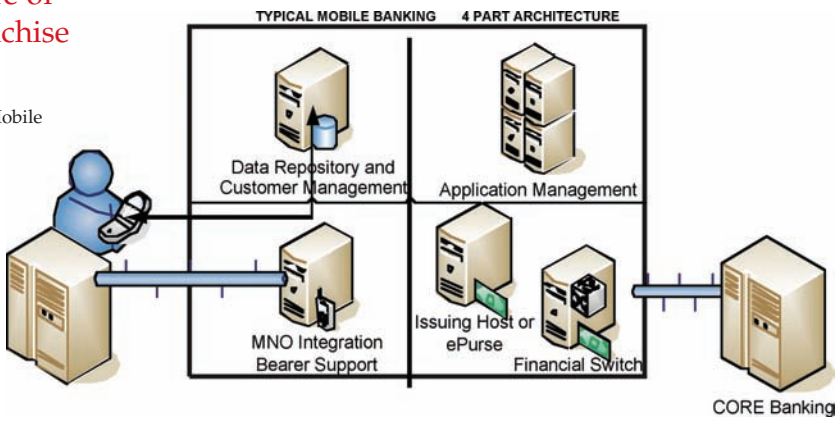
The benefits to the bank would be an increase in bank account customers, and therefore an increase in transactional or float revenue. Also the ability to cross sell products such as savings and loans to the newly banked consumer.

The benefits to the MNO would be a reduction in churn based on additional lock-in and value add provided by the new bank account service, increase in ARPU due to the data channel being used for bank transactions, as well as new non-traditional telco revenues such as forex spread on remittances.

The benefits to the consumer would be a new lower cost transactional tool and a single relationship with the MNO who also happens to be a 'bank'

Platform Architecture of New Payments Franchise on Mobile

2. New Payments Franchise on Mobile



In this diagram, the implementation facilitates a pseudo-banking environment away from the core banking system offered by a bank. The implementation would also leverage the MNO brand and distribution chain for the opening of bank accounts and also leverage a banks banking license.

This model is closer to the MNO as Bank model depicted in the section discussing roles of the operator in the MNO value chain.

The MNO would source both a mobile banking platform as well as a Bank Account Host or issuing host.

The development of a purse or stored value balance on the SIM card or on a server would allow for an entry level transactional capability because the MNO does not have to own a complete core banking system.

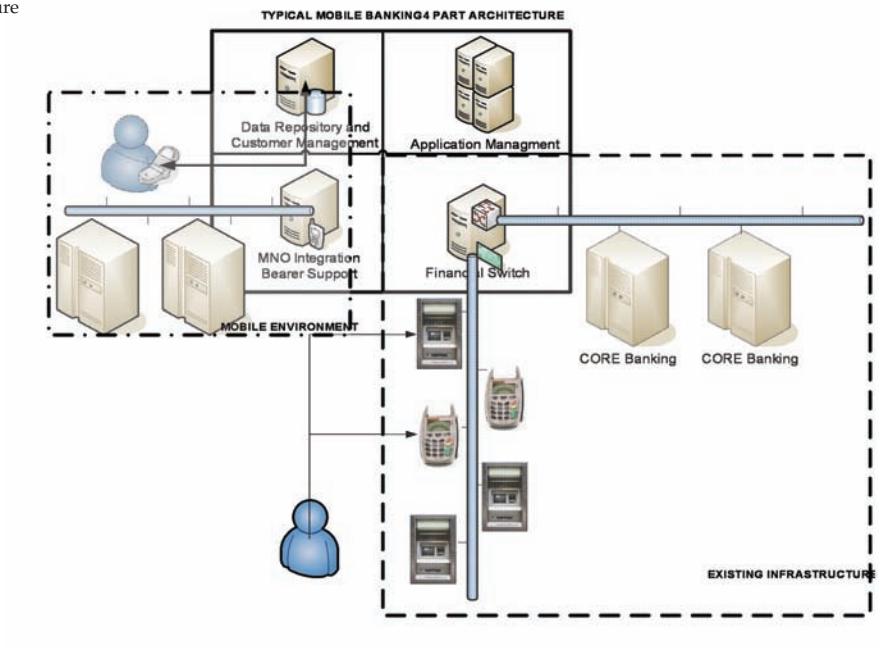
A key business question would be how to load the purse or stored value application with cash since there is no bank account connected to the traditional channels of electronic credits, ATMs and branches for example.

The core banking system integration depicted above would be a means to load the stored value application from a traditional bank account and then use the stored value application balance for transacting. However this requires the customer to have a bank account as well as the wallet, which may counter balance the 'ease of access' benefits and cost benefits of having a wallet in the first place.

The use of the MNO distribution and brand as well as the benefits of this model would be similar to the previous model. The key difference is the additional cost of a separate or proprietary banking system from that of the actual bank.

Shared Infrastructure Architecture

3. Multiple Channel, Multi Party, Shared, Mobile Banking Infrastructure



The diagram above depicts a typical shared or on-behalf platform in a market. This is where the mobile banking infrastructure has been implemented around a shared industry ATM/POS/EFT/Mobile Banking Switch.

If this environment is implemented in a bank and MNO neutral fashion, the platform owner would be able to service multiple banks and multiple MNOs thus allowing the clients of any of those banks or those MNOs to transact with each other.

The bearer channel supported would not affect the architecture but may affect the customisation of the consumer facing technologies in that server side applications are easily customisable as it is in a central location and client side applications would require customisation per bank and per device or SIM type.

The same ATM switch can be used for the processing of mobile banking transactions.

The benefits, MNO brand and MNO distribution channel in this model are similar to the previous two models, however there is an added benefit of leveraging the markets ATM, POS and shared mobile banking platform infrastructure to deliver mobile financial services through. The bank product offered by the MNO would thus be able to be used at additional points such as ATM and POS.

Vendor Analysis

This section provides an introduction and overview of the leading Mobile Banking/Commerce vendor solutions available to MNO's and Banks.

The role of the mobile banking vendor

The Mobile Banking environment requires both a Bank and a MNO to deliver a transactional or informational banking service to a consumer through the mobile phone.

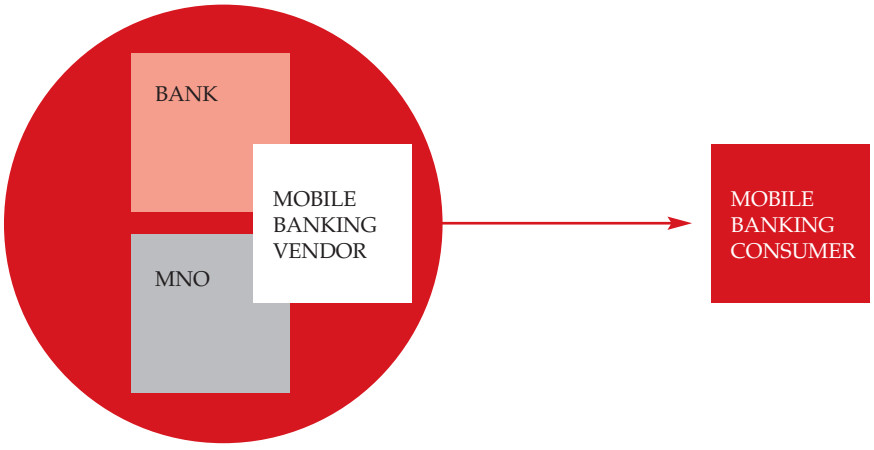
In this description, neither the bank, nor the MNO, can deliver the solution to the consumer in isolation.

In some examples, the MNO has delivered a MNO branded bank/banking application to the consumer, however the MNO has had to still partner with a bank for their financial license or processing capability or acquire a banking license and source bank processing capability.

In some cases, the Bank has delivered a Bank branded mobile banking application to the consumer, however the bank has had to make use of, or partner with the MNO for its infrastructure to provision the application and for ongoing financial transactions.

Often times the debate as to who owns the customer for a mobile financial service is endless between the two parties.

The Mobile Banking Vendor plays the pivotal role of integrating the bank and the MNO and technically delivering the application to the consumer.



This analysis evaluates the following components:

1) Geographic Fit

2) Functionality

- Service Offering (Financial Transaction type)
- Bank Product Support
- Bearer Channel/Consumer Application

3) Vendor Business Model

- ASP
- Licensing
- Engineering

4) Ability to Implement

- Implementation Status
- MNO Integration
- Bank Integration
- Complexity of implementation

5) Technical Architecture options

- Wireless Application Service Provider's
- Application Development
- Bank System support
- Additional components

6) Audits/Certifications/Endorsements

All elements of the analysis were done on a 'have completed and launched' basis as opposed to 'possible or in development or trial'.

1) Geographic Fit

An assessment of the vendor's location, implementation, and representative footprint assists in establishing the likelihood of the vendor to be able to deliver the solution in your market.

Geographic fit is defined as:

- Actual Geographic presence (where the office is)
- Where the vendor has implemented their solution

It is advisable to also establish where the vendor has representation in the form of actual staff/partnerships that can adequately foster implementation as opposed to just representation in the form of sales offices.

	Multiple markets	Africa	Americas	Middle East	Europe inc. UK	South Asia	Asia Pacific
Bhart TeleSoft						•	
C-SAM	•		•			•	•
Fundamo	•	•					
G-Cash							•
GFG							•
Jigrahak						•	
mCheck						•	
MiPay	•			•	•		
MobiComp					•		
Monitise	•		•		•		
Movensis					•		
mPay							
Mpesa	•	•				•	
mTranZact		•					
OBOPay			•				
PayBox	•	•	•	•	•		•
PayM8	•	•					
S1(Postillion)	•		•		•		
Simplus	•	•					
SMART							•
Utiba	•	•	•			•	•
Valista			•		•		

2) Functionality

The core functionality offered is the extension of a banks payment franchise to the mobile phone.

This involves both the bank in the transaction offered, and the MNO in the mobile channel used to perform the transaction.

Transactions:

While vendors support some transactions and not others, it is noted that if a vendor has implemented transactional banking services, they would typically be able to implement any financial transaction.

The supported transactions are categorized as:

Domestic Money Transfer	Ability to transfer money within a market
International Money Transfer	Ability to transfer money to other markets
Transactional Banking	Transactions that debit/credit an account
Informational Banking	Balance enquiries; mini statements
Top Up	Electronic re-load of airtime
Bill Payments	Utility or telco bill payments
Card Acquiring	Mobile phone as a card-accepting device

Key differences in supported transactions would relate to the banking product implemented.

Support of card based banking products would mean that the vendor could typically process MasterCard or Visa Card type transactions. If the vendor has only implemented card based banking products they may have difficulty in implementing transactional banking services direct to a bank account. And the same applies for vendors that have not implemented card based services. If the vendor has implemented on card type payments they would probably also only be connected to a payment gateway or acquiring bank institution and thus be limited to process purchases.

It is also noted that some vendors offer a proprietary purse or stored value system where there is no requirement for a bank account or bank integration. These solutions are subject to regulatory approval in each market and are not interoperable with the global payment systems.

Channels:

The mobile channel that the consumer will adopt is a key deciding factor on which vendor and which technology to support. The vendor analysis outlines what the vendor has implemented as opposed to what they can implement.

The channels identified are:

Client Side	-	SIM based/dependant applications
		JAVA/J2ME
Server Side	-	USSD2
		IVR
		SMS
		WAP

Each channel presents differing benefits and concerns and can have an affect market adoption and the security of the application.

Ironically the best technical and most secure solution (SIM) also has the highest barriers to implementation.

MNO's should adopt a multi-channel approach to allow consumer choice and manage the risks around application adoption, with a view to migrate the consumer as/when the market is saturated with the preferred technology.

This should ensure speed of uptake and optimize user experience.

SIM based/dependant applications are more likely to be successful in new Telco markets where the SIM penetration is low and a roll out of the application is strategically aligned to the roll out of SIM cards in that specific market.

In markets where SIM penetration is already at saturation, it is understood that the consumer would have to either swap their SIM for another SIM bearing the application, or have the application downloaded to their SIM from the network.

This has proven to be a stumbling block in many markets where consumers do not take to solutions that require consumer intervention in getting the application.

SIM based applications are however the most secure in that the data can be encrypted on the actual SIM card and be transported from the device to the bank in an encrypted format.

SIM Based applications do offer the ability to prevent churn in that the consumer SIM is owned by the network, and if there is additional value to that SIM it is unlikely that the consumer would churn.

This can be managed in the server side environment by provisioning exclusive services.

REFERENCE VENDORS:
SMART PHILIPINES (SMART/GFG GROUP)
CELPAY DRC AND ZAMBIA (FUNDAMO)
MTN BANKING SOUTH AFRICA (FUNDAMO)
ABSA BANK SOUTH AFRICA (OWN DEVELOPED)

JAVA applications offer a higher level of aesthetic value for the user than SIM, but face the same accessibility problems in getting the application to the device. JAVA applications reside on the actual device and need to be downloaded by the consumer. This typically requires a packet data access (eg. GPRS or EDGE) connection to a network and knowledge of how to access the site from which the application needs to be downloaded. This application could pose an issue in the usability of the service if the consumer has not already configured packet data access on their phone. Once the consumer has the application on the phone they should not see any further problems.

To alleviate the concerns around accessibility, MNO's could have the application pre-installed on handsets as they saturate the market. This would mean that the consumer would not be affected by the download or settings required to operate the application

It is believed that the source from which you are downloading the application cannot be verified by the consumer and steps should be put in place not to make the application publicly available but rather facilitate a download process as part of registering for the service. There is not immediate lock in of the consumer to the MNO on JAVA as it can communicate across any network.

It is also a concern, as with any client side application, that consumers would have to reload the application if the bank/MNO were to modify the application in any way.

REFERENCE VENDORS:
MULTIPLE BANK AND TELCO UK (MONITISE UK)
C-SAM US (WEB REFERENCE)
OBOPAY US (WEB REFERENCE)

USSD2 is a channel that has been successfully used in mobile banking implementations as an alternative to menu driven SIM based applications, in markets where the bank or MNO do not believe that the consumer swap or download would affect the adoption rate.

USSD2 does not offer the device level encryption of data and thus would require business rules and methodologies in protecting the consumer's data.

If the network supports USSD2, effectively each consumer can use the channel without affecting the SIM or the device.

USSD2 lacks in the aesthetic values that JAVA or WAP bring. The channel benefits in first-usage usability.

REFERENCE VENDORS:
WIZZIT BANK SOUTH AFRICA (SIMPLUS)
FNB SOUTH AFRICA (OWN DEVELOPED)
EQUITY BANK KENYA (MTRANZACT)

IVR (interactive voice response) is DTMF tone entry in response to a voice based menu presented to the consumer. The most common channel for the consumer as the consumer knows how to make a call. The channel offers education on the phone in that the consumer can be instructed in their language.

The channel has existed for many years as telephone banking and is thus not innovative or new to the banking world. It suits emerging markets or markets that do not have any other technology choice.

The channel is seen to be expensive to the consumer that has to dial in to use the service at their going call tariff rate.

IVR is supported by most vendors and is referenced by many sites across the world.

IVR can be used by any consumer in the market and does not support any limitations or preventions of churn.

REFERENCE VENDOR:
MASCOM BOTSWANA (PAYM8)

SMS Based applications may be the simplest form of mobile banking implementation. The solution is not intuitive and has no aesthetic value but is as simple as sending an SMS.

SMS is used primarily as an informational banking tool as opposed to transactional banking. The reason being that transactional banking requires certain levels of security, and while SMS is encrypted using the standard GSM encryption across the air, it is stored in the sent items of the consumers handset, and possible stored in the open at the network and at the vendor.

There are examples of Transactional banking implementations on SMS where the risk has been managed through limitations in transaction amounts and data transmission.

SMS based solutions also do not support prevention of churn.

REFERENCE VENDOR
MOVENSIS SMSBANK

WAP based solutions offer aesthetic value and a similar experience to that of the Internet. It is device dependant and requires a packet data access (eg. GPRS or EDGE) connection with the network.

Consumers do not know how to browse on their mobile phones or have not configured packet data access.

Typically used in segmented implementations targeted at a higher end consumer base with a higher end device and appetite for aesthetic value.

REFERENCE VENDOR:
C-SAM US
NEDBANK SOUTH AFRICA (OWN DEVELOPED)

3) Vendor Business Models

Two principle models emerged from the vendors:

a) **Application Service provider or hosted model,** where the vendor owns and manages the infrastructure and banks or MNO's integrate into the infrastructure and share the services. This model has worked well in markets where the banks/MNO's do not want to invest too heavily into their own infrastructure. Examples of successful models ASP models would be Monitise in the UK, Simplus in South Africa, and mTranZact in Kenya. In these cases multiple banks and multiple MNO's use the same infrastructure. The services are typically billed on a per-transaction, per-consumer, or monthly management fee basis.

b) **Licensing model,** Most of the vendors prefer an outright licensing model that allows the MNO or bank or in-market consortium to own the technology for a licensing fee. The vendor typically becomes the development and maintenance house for the application. Examples would be Fundamo with MTN Banking, and Utiba in multiple market implementations.

Some vendors offer both models where technically feasible. Some vendors insist on using single market hosting services which may pose communication and integration dependencies.

Some vendors also offer the option of having a customised and once off application engineered for the MNO or Bank.

4) Ability To Implement

The actual implementation of a vendor should be cross-referenced and is a major factor in evaluating some of the vendors in the list. Implementation status proves that the vendor has actually implemented and has proof of such implementations.

It is especially beneficial if a vendor has a commercially viable implementation to show, or is cash flow positive as Mobile Banking is relatively new technology.

Vendors without live implementations were excluded from the analysis.

It is also worth noting if a vendor has done both a MNO and bank level integration, as these are the two major components of an end-to-end system.

MNO Integration	–	Into the bearer channels (USSD2 Gateways; SMSC)
	–	For service provisioning (OTA Downloads etc)
	–	IN platform for direct load of purchased airtime
Bank Integration	–	Into bank switching or processing environments

Bank integrations are highly complex and time consuming considering the levels of security and standardisation that needs to be complied with.

5) Technical Architecture Options

Mobile Banking Vendors play one or more of the following 4 roles:

Wireless Application Service Providers (WASPS)

This is where they facilitate the communication or transport layer of the banking service. i.e. carry the instruction to/from the consumer and not any levels of integration into the actual bank. These vendors are referred to as Wireless Application Service Providers.

Application Developers

The vendor would provide the skills to develop the actual application that resides on the consumer's phone or interfaces with the consumer. This would be the WAP Site, JAVA Application, USSD2 Gateway and Menu flow; SMS Gateway; or SIM Application.

Bank System Support

The vendor would house a financial switch and intelligence to integrate or support the bank system. The vendor would thus be able to translate the instruction from the consumer and submit it in a transaction format that the bank would accept. The vendor would thus have complied with several security requirements; audits; or certifications.

Additional Components

The vendor would be able to offer additional components such as customer management systems; card management systems; reconciliation or settlement systems; reporting functions; etc.

6) Audits/Certifications/Endorsements

The Banking environment is filled with audits and certifications and it is suggested that the Vendor chosen also undergoes some form of 3rd party audit.

Examples of these audits/assessments can be found through MasterCard or Visa Vendor Programmes and through Global Payment Card Industry (PCI) compliance. See the following websites for more information:

www.pcicomplianceguide.org
www.mastercard.com/us/sdp/index.html
www.usa.visa.com/merchants/risk_management/cisp.html

Summary

The ideal vendor would be able to deliver an adequate transaction set, on a broad number of bearer channels/applications that the consumer could adopt within the market.

This Vendor would have shown proof of a successful implementation, and if not in your market, would show proof of ability to implement in another market.

This vendor would have completed a Bank and MNO integration and complied with industry standards for security and financial transaction processing.

The Vendor would preferably be supportive of the banking environment and have shown integration and development or partnership with Banks or Bank Associations.

Definitions

mWallet

At the heart of the MMT initiative is the concept of the 'mWallet'. A 'mWallet' is essentially an aggregator of payment instruments. It is a data repository that houses consumer data sufficient to facilitate a financial transaction from a mobile handset, and the applicable intelligence to translate an instruction from a consumer through a mobile handset/bearer/application into a message that a financial institution can use to debit or credit bank accounts or payment instruments.

A mWallet includes functionality such as:

- Authentication of the consumer
- Storage of billing and shipping addresses
- Storage of details of bank account, payment card, payment purse or any other payment instrument
- Storage of transaction history
- Integration to a bank, perhaps through a financial switch, for purchase, payments and transfers

Payment Service Provider

A Payment Service Provider (PSP) is a term for a third party that facilitates the processing of financial transactions from consumer interfaces such as Point of Sale, Web and Mobile, to financial institutions. A PSP would typically use a financial switch and a wallet infrastructure to process consumer initiated financial transactions off mobile. PSPs are required to complete certifications and audits in order to comply with the stringent security and processing standards levied by the payments industry at large. A PSP would typically sit between a bank and a consumer banking or transacting channel. PSPs would be integrated into a bank through a financial switch and would typically construct and process ISO 8583 standard financial messages.

Payment Instrument

Either a payment card (eg Visa, MasterCard), bank account, or ePurse issued by a licensed financial institution to a customer for the purposes o transacting (or some other instrument that provides the same purpose and meets local legislation). Details of the payment instrument are stored in the m-Wallet for use during mobile remittances.

E-Purse

A stored value account with usage similar to currency. Normally built upon a proprietary system and sometimes outside of a bank. This electronic currency is used for payments within a closed community of users whose 'accounts' are maintained on the ePurse ledger system.

Payment Card Industry Compliance

Payment Card Industry (PCI) compliance is a set of security and processing standards levied on entities that process card based transactions.
See: www.pcicomplianceguide.org

Third Party Processor

Third Party Processor (TPP) is an entity that processes on behalf of a bank. These processors are required to adhere to PCI as well as stringent other certification and audit requirements.

GSMA London Office
1st Floor, Mid City Place, 71 High Holborn, London WC1V 6EA, United Kingdom
T +44 (0) 20 7759 2300

GSMC Atlanta Office
GSM Conference Ltd. 115 Perimeter Center Place NE,
Suite 308, Atlanta, Georgia, GA 30346-1249, United States of America
T +1 678 736 2331

www.gsmworld.com