A converged approach to mobile financial services

Of the current global population – estimated at just over 7 billion people – 2.5 billion do not have access to bank services[1], whereas 5 billion have a mobile phone subscription[2]. Providing financial services via the mobile phone can bridge this gap, bank the unbanked and the under-banked, and bring all mobile commerce (m-commerce) stakeholders together.

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The unique position MNOs hold in providing communication services and the potential revenue opportunities presented by mobile financial services have put m-commerce high on the agenda of most operators. M-commerce is still in its infancy, and the uptake of related services varies greatly from region to region. In Sub-Saharan Africa, for example, 14.5 percent of people over the age of 15 use their mobile phones to receive money, while the figure for Europe and Central Asia is 2.7 percent[3]. The opportunities for operators would be greatly enhanced by the existence of a global ecosystem connecting mobile networks, banks and digital mobile-wallet (m-wallet) platforms, operating across systems, currencies and national borders.

In most parts of Africa and other emerging markets, one of the key drivers for the creation of such an ecosystem is the need to bank the unbanked. When it comes to developed markets, the need to make purchasing easier is a key driver for facilitating mass-market uptake. Together, these market drivers are expected to accelerate growth in m-commerce so that the industry will process more than USD 800 billion globally by 2016 (see **Figure 1**).

The innovation is likely to be most readily adopted in emerging markets, where an estimated 1.7 billion people have access to a mobile phone but have no bank account. The m-wallet is a key element in bringing a virtual bank account and all of its related services into a mobile phone securely. In 2011, a total of about USD 350 billion[4] was sent by international money transfer to people in developing countries. The majority of these funds were sent by migrant workers back to their countries of origin. Clearly the ability to perform such transactions quickly and securely through a trusted partner is vital to many people – and so the window of opportunity for operators to expand their scope in this market is now open.

About 140 m-wallet platforms have been deployed globally, with over 100 more being planned[5]. Most of the uptake is in Africa, where about 10 percent of operators' subscribers are using mobile money services[3]. Although the services currently available remain limited and basic (airtime purchase, money transfer and payment of utility bills, for example) consumer interest is growing, and the big question is, who will expand the existing m-wallet services and drive mass-market uptake?

Segmentation

While the same types of financial services tend to be available in both evolving and developed markets, their accessibility and the extent to which they are used can vary greatly. In emerging markets, the dominant services are basic ones such as domestic and international person-to-person money transfer, merchant payments, bill payments, microloans, insurance payments, and cash-in/out through agents. In developed markets, the emphasis is on services that simplify payment for small, frequent purchases, such as online ticket payments, downloads of mobile apps, and in-store NFC payments. Figure 1 illustrates the projected market growth by segment for emerging and developed markets combined.

Mobile money services

The cornerstone of any system

BOX A **Terms and abbreviations**

3PP	third-party provider	PA-DSS	Payment Application Data Security Standard
AML	anti-money-laundering		
ATM	automated teller machine	PCI DSS	Payment Card Industry Data Security Standard
G2P	government-to-person		
HSM	hardware security module	PIN	Personal Identification Number
KYC	know-your-customer	POS	point-of-sale
MNO	mobile network operator	SAT	SIM Application Toolkit
MTO	money-transfer organization	SIM	subscriber identity module
NFC	near-field communication	SLA	Service Level Agreement
NGO	non-governmental organization	SME	small and medium-sized enterprises
OFAC	Office of Foreign Assets Control (US)	SMSC	Short Message Service Center
OSS/BSS	operations and business support systems	TX	transaction
		USSD	Unstructured Supplementary Service Data
P2P	person-to-person	WS	web service

delivering mobile money services is a wallet platform. Such a platform, illustrated in **Figure 2**, enables operators, banks and service providers in a wide variety of markets to provide mobile money services to their users. Along with the traditional services such as SMS, voice and airtime top-up provided to subscribers, with a wallet platform operators will also be able to provide banking services including loans and savings accounts.

Stakeholders

The m-commerce ecosystem encompasses a large number and wide variety of stakeholders from several industries, each with diverse business goals. These players include agents, operators, banks, MTOs, and different types of service providers, as well as internal actors from the operator side. Agents act as cash-in/out points for the consumer; whereas operators and other service providers deliver the ecosystem's functions, such as settlement, reconciliation, billing and payment; and the internal actors deliver various support functions including compliance, customer service, marketing and product management. **Figure 3** shows the main stakeholders and the actions that they typically perform.

Network architecture

There are a substantial number of integration points between the m-wallet platform and the other actors in the m-commerce ecosystem, which is clearly illustrated in Figure 3. Consider the implementation of just one basic task that users in an m-commerce environment perform regularly: accessing their m-wallet via a mobile device. There are several ways of implementing this function: through a web interface, USSD, a SIM Application Toolkit (SAT), or a mobile app. Typically, an m-wallet platform will integrate with OSS/BSS as well as with partner banks for settlement of funds, and with money-transfer organizations (MTOs) for domestic and international fund transfers.
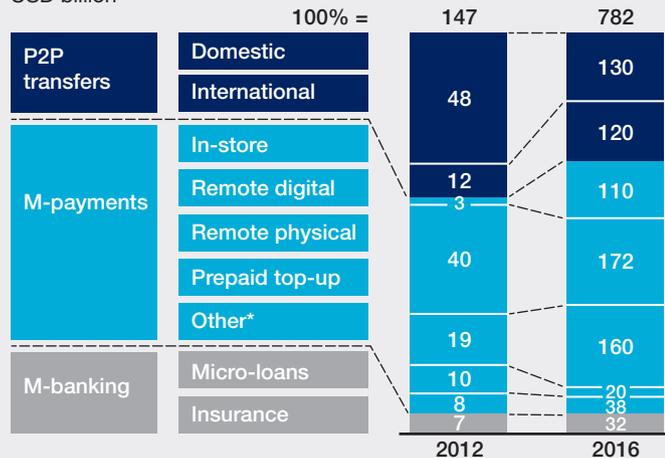
Cash-in/out

One of the fundamental functions of any bank or financial service is to give people the ability to deposit and withdraw cash. Users need to be able to put

BOX B

Drivers in emerging markets: mobile money transfer, bill payments and prepaid top-ups
Drivers in developed markets: online payments, download of mobile apps and instore NFC.

FIGURE 1 Growth by market segment

Global m-commerce market forecast
Transaction volume = processed money
USD billion

*Ticketing, vending, coupons, bill payment, payroll, G2P/NGO payments, SME payments

cash into their m-wallets and get money out of them. One way of implementing cash-in/out is through an agent. An agent could be an existing partner or a retailer selling airtime or mobile subscriptions – this kind of actor handles significant amounts of cash and therefore has the necessary procedures in place to handle cash-in/out transactions. When a consumer performs a cash-in transaction through an agent, the cash is handed over to the agent, who then uses their mobile phone to transfer the amount from their wallet to the consumer's. To perform a cash-out transaction, on authorization by the consumer, the agent's mobile device can transfer the amount from the consumer's wallet to the agent's, and the agent can then hand over the cash directly.

Naturally, for an m-commerce ecosystem to be successful, there is a need for thousands of agents in close proximity to consumers, providing convenient access. Such a setup will lead to a huge amount of administrative overhead to authorize and monitor many small actors. So, aggregators and super agents acting as intermediaries are an essential layer in the ecosystem hierarchy.

Another way of facilitating cash-in/out is to link the consumer's wallet to a bank account – which supports transfers between the wallet and the account.
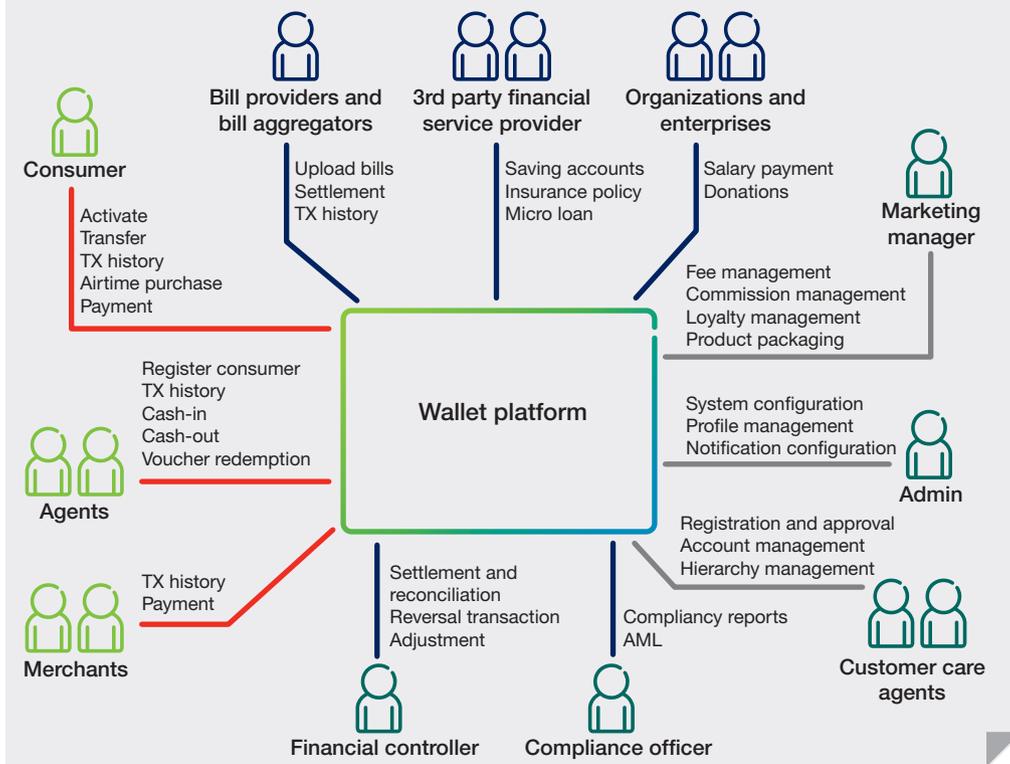
By integrating wallets with networks of automated teller machines (ATMs), the cost of supporting physical agents for cash-in/out operations can be overcome and people can access their wallets through the nearest cash dispenser.

As well as enabling cash-in/out, ATMs can enable subscribers to carry out other activities such as balance inquiries, money transfers, foreign-currency withdrawals and phone-credit purchases. To access their m-wallet from an ATM, a subscriber first needs to have their mobile device authorized by their operator. When they withdraw cash from an ATM, for example, they enter a one-time PIN code sent at the time of transaction to their registered device. The bank network or middleware, which connects the ATM to the operator's wallet platform, carries out the appropriate authorization-request-and-verify function in real time. If authorization is granted, the operation is completed atomically and the subscriber's wallet balance is updated accordingly.

Access

The primary access technologies used to enable consumers, agents and merchants to carry out mobile money transactions are still USSD and SAT – text, menu-based approaches. These approaches are limited. The rise in ▶▶

FIGURE 2 M-wallet platform and stakeholders

Consumer
Activate
Transfer
TX history
Airtime purchase
Payment

Bill providers and
bill aggregators
Upload bills
Settlement
TX history

3rd party financial
service provider
Saving accounts
Insurance policy
Micro loan

Organizations and
enterprises
Salary payment
Donations

Marketing
manager

Fee management
Commission management
Loyalty management
Product packaging

Wallet platform

Register consumer
TX history
Cash-in
Cash-out
Voucher redemption

Agents

System configuration
Profile management
Notification configuration

Admin

Merchants
TX history
Payment

Settlement and
reconciliation
Reversal transaction
Adjustment

Registration and approval
Account management
Hierarchy management

Compliancy reports
AML

Customer care
agents

Financial controller

Compliance officer

the uptake of smartphones is likely to shift this front-end interface to a mobile app that can provide a richer user experience.

In-store payments

Users can buy physical goods in stores through direct wallet-to-wallet transfer using a prepaid or direct-debit card. If both the merchant and the consumer have signed up for an m-wallet service, payment can be made directly by means of a wallet-to-wallet transfer that may be initiated by either party.

A second way of using the wallet platform for in-store payment is through a prepaid or direct-debit card that is connected to the user's wallet. The user can make payments in a store by swiping their card through the merchant's point-of-sale (POS) device. The transaction is authorized over a payment network by validating the balance of the wallet linked to the card. For transactions using credit cards issued by major companies such as American Express, VISA or MasterCard, authorization will take place over the payment network of

the card issuer. For merchant prepaid cards and other approved prepaid cards, authorization will be granted using the payment network of the operator delivering the platform.

NFC – a relatively new technology – removes the need for a physical card in making payments. The user simply holds their mobile device near the NFC-enabled POS to initiate payment, and this way their payment credentials (a virtual card pre-stored in the phone) are transferred over the air. The first commercial deployments of this promising technology have already been completed.

Enabling NFC payments on feature phones is implemented through attaching an NFC sticker to the phone and associating the sticker with the mobile subscription identity of the phone.

When the wallet platform receives a payment request for a given sticker, a USSD query is sent to the subscriber, asking for approval – implemented in the form of a user-entered PIN. In this way, a stolen sticker cannot be used to make a payment.

Security

A mobile money platform needs to meet very high security standards to safeguard the financial information stored in it and transferred across it. It needs to provide functionality that ensures the service provider complies with the appropriate regulatory and compliance requirements. Crucial for the trustworthiness of a given platform is the ability to assure the security of the non-repudiation function – which assures the identity of a person performing an action. The security-related standards that are usually followed when designing financial systems such as wallet platforms are PCI DSS, PA-DSS and ISO/IEC 27000.

Controlling access is a critical part of achieving the overall required level of security.

At a given level, access control can be implemented through the definition of role-based permissible operations for the different actors in the ecosystem: consumers, agents, customer service representatives, merchants and internal staff. To support the operator's organizational structure, a wallet platform should provide flexible methods and tools to define roles and associated permissions. Other levels of access can be controlled through the definition of threshold values; for example, the number of unsuccessful logons permitted before an account is blocked, or the maximum amount of money that can be sent or received over a given network.

Verification procedures

Financial services are key targets for fraud. To prevent money laundering and terrorist activity, national regulations such as know-your-customer (KYC) and anti-money-laundering (AML) laws stipulate the type of verification procedures that need to be performed by a provider of financial services. Typically, checks are performed during customer registration, during transaction processing and at regular intervals.

During customer registration, KYC checks are performed to verify the identity of a potential subscriber before access to a service is granted. For the most part, the type of identity verification required is dictated by local regulations, account balance and transaction limits. For example, EU e-money regulations (such as Directive 2000/46/EC)

stipulate that no identity verification is required for an m-wallet balance or transaction request for amounts below a few hundred euros – although individual national authorities can set lower limits. Above these limits, a subscriber must provide an official identity document before access to the service can be granted.

During transaction processing, service providers are required to impose transaction limits and apply screening checks to subscribers carrying out financial operations. A wallet platform is usually equipped to perform this kind of check based on sanction lists, such as those created by OFAC in the US.

At regular intervals, historical transaction-pattern data should be analyzed to identify suspicious behavior. Any such findings should then be reported to the relevant authorities.

Settlement

A wallet platform performs many thousands of transactions every day. These transactions include cash-in/out, money transfers, purchases and returns. While the result of a transaction is reflected immediately in the balance of a wallet, the actual movement of funds (from the operator's trust account at the partner bank where the funds are actually stored to the beneficiary's bank account) is handled as a batch activity, typically performed once or several times during a single business day. To enable the settlement of funds, a wallet platform must maintain a log of all transactions performed during each settlement period.

Bill payment

One of the most widely used financial services is bill payment. **Figure 4** illustrates how a wallet platform could support this process.

Converged solution

No matter the industry, an effective solution for delivering new services will build on the strengths of current infrastructure and expand the capability of existing tools. Today, most operators provide airtime, messaging and data services as part of their fundamental offering. Products are priced according to a charging system with many subscriber-related parameters, bonuses, special offers and standard

FIGURE 3 M-commerce ecosystem
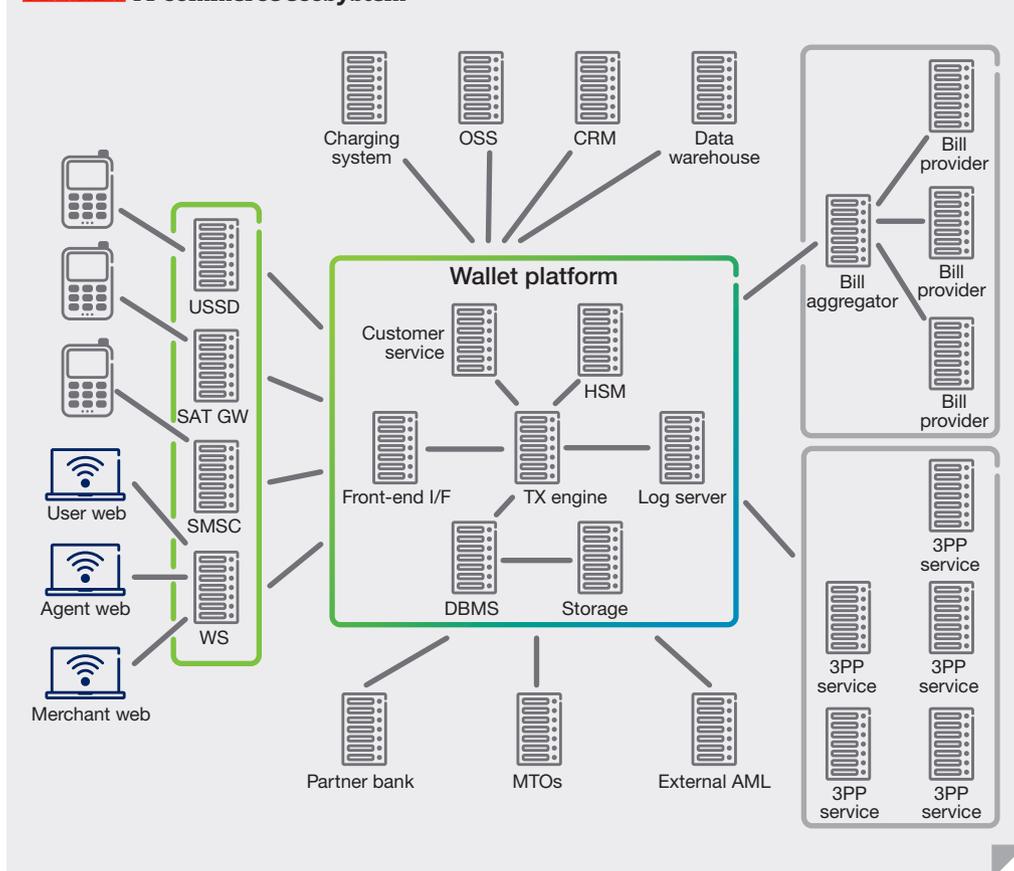
charging rates taken into consideration. Leveraging this asset, by reusing the rating engine and tools to cost and configure financial services, will help operators to deliver these in combination with traditional telecom services using the same subscriber database.
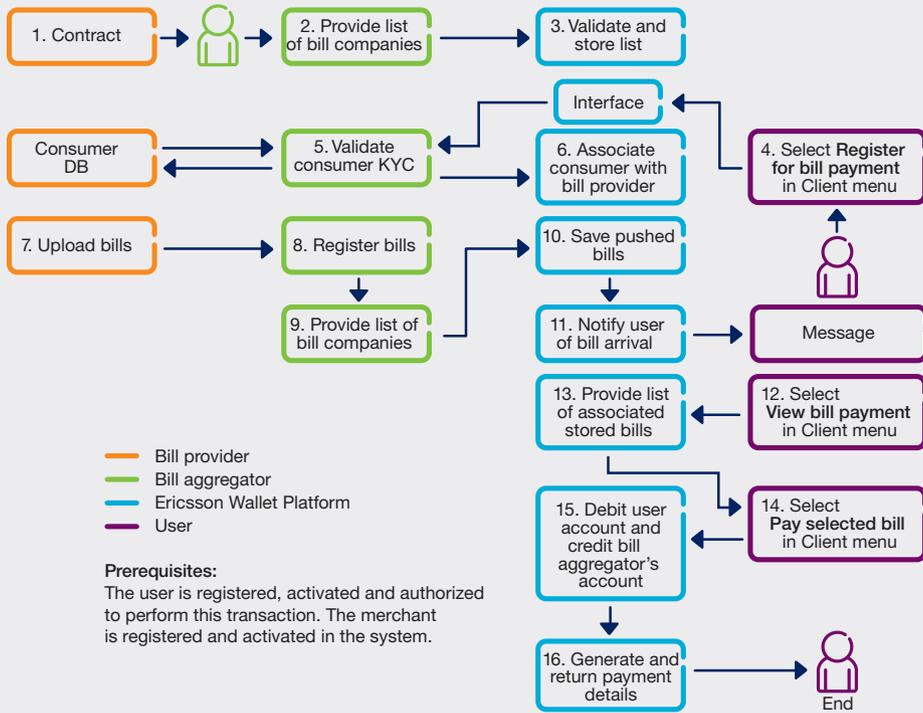
This converged approach will reduce time to market for new services as well as operational costs. However, providing financial services through the existing telecom infrastructure will require the implementation of some additional functionality:

- atomic processes – to ensure that an operation is completely successful and all accounts involved are charged and updated accordingly;
- transaction authorization – to provide support for explicit user approvals, often granted through the use of PINs;
- access control – to ensure that users can perform only the actions for which they have the associated rights and privileges;
- sanction screening – to perform KYC

inspections, which in the US and many parts of Europe includes checking identities against published sanctioned lists.
- AML compliance – to adhere to national limits, such as maximum account balance, maximum number of transactions permitted within a given period of time, and maximum amount allowed per transaction;
- data integrity – to ensure the accuracy and consistency of data cannot be compromised;
- data encryption – to protect sensitive information from being accessed by unauthorized users;
- transport security – to protect information flow between the wallet platform and external systems, such as web browsers, third-party service providers, banks and remittance hubs;
- agent management – to support the agent, super agent and aggregator hierarchy; and
- bank integration – to hold custody accounts and provide settlement and reconciliation functions.

FIGURE 4 Bill-payment process

Bill provider
Bill aggregator
Ericsson Wallet Platform
User

Prerequisites:
The user is registered, activated and authorized to perform this transaction. The merchant is registered and activated in the system.

▶▶ There are many use cases where traditional telecom and financial services are combined, such as the reuse of the family and friends definition, notifications and sloped charging.

Attaining critical mass
Payment and mobile-communication systems have one thing in common: they are both network industries. In other words, the business model for these services is based on senders and receivers. A phone call requires a sender, a receiver and a transfer mechanism – the same applies to money transfers. As more people use a network, more services can be developed, and so the network provides greater value to its subscribers. Understandably, one of the recurring questions surrounding new payment services is how to reach the critical number of users needed to attract the mass market and protect investment.
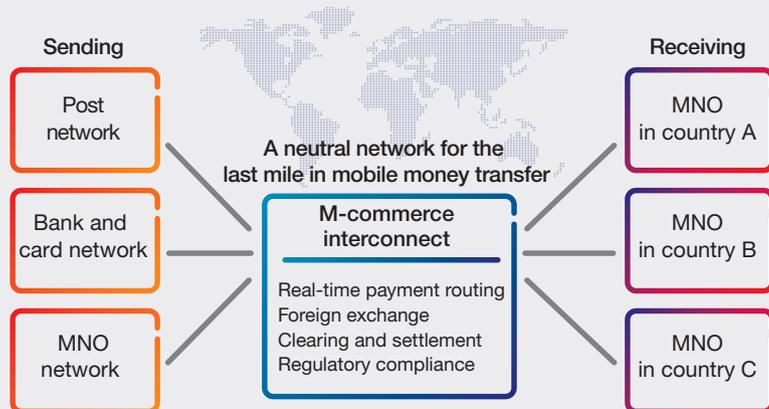
Enabling interoperability between networks – so that users in one network can reach users in another – is one of the common ways of attaining critical mass. For payment systems, the interconnect role (**Figure 5**) is often held by an intermediary, brokering between the different networks. For example, the intermediary in domestic bank transfers and ATM transactions is the automated clearinghouse – such as VocaLink in the UK and SIA in Italy. VISA, American Express and MasterCard play a similar role in global card payments. As well as providing technical interoperability, the value provided by the broker lies in their ability to create economies of scale as a payment processor, where the cost per transaction decreases as the number of users increases.

Unfortunately, most m-wallet structures lack interoperability, which makes it difficult for operators to reach the mass market. According to GSMA, 140 live mobile money platform deployments currently exist worldwide[5]. Most are closed networks, and only a few have more than 1 million users. In many ways, this situation resembles the beginnings of mobile communication networks, which had no interoperability and consequently could only provide users with limited services and value.

One possible way to provide interoperability is to create a clearinghouse that acts as a bridge between m-wallet networks and traditional bank and card networks. The case of international remittances (migrant workers transferring money back to their home countries) highlights how users' needs can be supported by such a clearinghouse model, where the goal is to make money transfers as simple as sending an SMS.

Top of the agenda for the global payment industry and policymakers is international remittance. The reason is simple: in 2011, a worldwide total of approximately USD 350 billion was transferred to developing economies[2], mostly by migrant workers living outside their home countries. Millions of people depend on this influx of cash to meet their daily living expenses and support their investments. According

FIGURE 5 M-commerce interconnect

Sending

Post network

Bank and card network

MNO network

A neutral network for the last mile in mobile money transfer

M-commerce interconnect

Real-time payment routing
Foreign exchange
Clearing and settlement
Regulatory compliance

Receiving

MNO in country A

MNO in country B

MNO in country C

to the World Bank, international remittance is the largest source of external financing in some developing countries, accounting for as much as a third of GDP in some cases – including Lesotho and Tajikistan[3]. Many people who receive remittances are often unbanked and live in rural areas at a significant distance from the nearest bank. And so accessibility and reach are key success factors for remittance services.

Payment infrastructures in mature economies rely heavily on bank-to-bank transfers, whereas many emerging economies lack the financial infrastructures needed to reach people in this way. The first wave of international-remittance providers solved this problem by building on existing retailer networks and post offices, creating a proprietary distribution network and retaining control over both the sender and the recipient channels. This is the model used by Western Union. The primary disadvantage of this model is the cost. It is a cash-driven approach that requires many physical outlets and does not build on the reach advantages of the mobile phone. Another negative aspect of this model is that it doesn't support consumers in mature economies wanting to transfer funds electronically, directly from their bank accounts.

The difficulty faced by banks entering the mobile market is that bank-to-bank networks alone are insufficient for creating the required reach. Banks still need to build bilateral relationships with partners, such as mobile operators and postal institutions, to reach potential customers.

To overcome the challenges presented by the existence of different payment networks, and at the same time take full advantage of mobile ubiquity, the solution should transmit payment messages and provide a global framework for clearing and settlement for the various actors in the ecosystem.

The clearinghouse model for mobile money transfer has the potential to bring operators, postal institutions and banks together to offer a superior service that allows each party to build on its core strengths. To create a global, neutral and payment-agnostic network, the key components are:

- global cooperation among mobile-network operators, postal institutions and banks active in mobile money transfer;
- a centralized platform for payment routing, processing, clearing and settlement to achieve economies of scale and interoperability among networks;
- real-time payment routing, clearing and settlement between different payment networks; and
- a legal framework securing uniform SLAs, compliance and security policies.

Conclusion

There are many stakeholders with different business models and diverging goals that are part of the m-commerce system – banks, operators, agents, aggregators, subscribers and money-transfer organizations. The aim is to build a sustainable ecosystem, where each party can provide key elements of the wallet platform, making it accessible and widespread.

The ecosystem will give the under-banked and unbanked access to a global payment network, where agents and users can work across national borders and currencies, maintain a very high level of security and comply with AML laws. By combining telecom and financial services into a converged wallet, MNOs can make the most of this opportunity to provide mobile financial services to the under-served.

The clearinghouse model can bring these stakeholders together and take advantage of the open window of opportunity to provide subscribers with financial services through the expansion of the telecom infrastructure. ✤

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