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A2A INTEROPERABILITY

Making Mobile Money Schemes Interoperate

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INTRODUCTION

1.1

Introduction and summary

Interoperability in the context of mobile money can mean many different things, but one of the most often cited use cases is for Mobile Money Operators (MMOs) to provide the ability for customers to undertake money transfers between two accounts at different mobile money schemes, alongside the ability to transfer money between accounts at mobile money schemes and accounts at banks. This paper is focused on this functionality, referred to as account-to-account (A2A) interoperability.

A2A interoperability in mobile money may create strong positive network effects; there is a wide body of research that investigates interoperability in payments systems and assesses the opportunity for participants that is created through network effects. Studies have found empirical evidence that demonstrates the positive network effects of A2A interoperability between banks, which could be expected to apply also for mobile money.

Inappropriate implementation choices, or a pre-mature regulatory mandate that forces untimely and unsustainable solutions for interoperability, may negate the potentially significant benefits that individual mobile money schemes can achieve by being part of a wider, interoperable network. As an example, price sensitiveness has resulted in the under-utilisation of certain bank payment schemes, illustrating the effect of too costly implementations or high pricing.

To avoid this, this paper presents a methodological approach to identify and implement an optimal solution for A2A interoperability. There are a number of implementation options; we bring up six different ones in this paper, ranging from bilateral between parities to a single central processor using an existing national banking service. As each implementation option for A2A interoperability is likely to affect the product and the mobile money operator in different ways; on pricing, governance and operational procedures for example, the choice of implementation option should be made based on a number of strategic considerations.

This paper introduces an evaluation framework to filter implementation options using a set of eight evaluation criteria. The most appropriate solution for any given market is not necessarily the same for all markets. Any evaluation needs to take into consideration the market context and capabilities of existing financial infrastructures. It is essential for the implementation to preserve the defining features of mobile money; that transactions are in real-time and at low-cost. The service should remain accessible and any introduced risks need to be properly mitigated. Price and accessibility are particularly important if A2A interoperability will have a positive impact on financial inclusion.

The implementation of A2A interoperability requires collaboration between commercial companies, often competitors. Getting companies to work together requires effective organisation and getting collaborations to deliver will require effective leadership and governance.

2
A2A INTEROPERABILITY AND MOBILE MONEY

2.1

What is meant by A2A interoperability

To date, each money mobile offering is being developed and deployed as a scheme in its own right – with its own platform, operating rules and independent networks of agents and customers. As each mobile money scheme is operated independently, typically, money transfers from one scheme cannot be made to another[1].

The ability to make a money transfer transaction from one scheme to another would signify schemes were interoperable. However, as others have described[2], interoperability for mobile money can mean a number of different things; in addition to transaction interoperability, it may include agent sharing and retail point of sale compatibility.

At its most basic therefore (and for the purposes of this paper), interoperability refers to account-to-account (A2A[3]) transfers between customer accounts at different mobile money schemes and between accounts at mobile money schemes and accounts at banks. Here, the expectation is that money transfers are between accounts owned mainly by individuals and small businesses.

In summary, the key functional requirements for A2A interoperability are the ability to:

- Directly transact between wallet accounts at different MMOs;
- Directly transact between mobile money accounts and bank accounts;
- Settle the funds for transactions across schemes and between schemes and banks;
- Implement common risk management practices that preserve the integrity of the individual mobile money schemes.

Naturally, there are a number of ways mobile money schemes can join together (and with banks) to interoperate for A2A transactions – for example, with decentralised networks of schemes or through centralised services. An overview of the implementation options available to address these key requirements is presented in the body of this paper along with a framework for their assessment.

1. Currently, this functionality is simulated by a 'voucher' transaction. When money is sent to a user outside of the mobile money scheme, a voucher code is created and sent to the recipient via SMS. The value of the voucher is stored on the originating platform and the value is required to be cashed-out in full at a cash-out location of the originating scheme. Therefore, it does not involve any communication between different mobile money schemes.
2. Interoperability in Electronic Payments: Lessons and Opportunities, Carol Coye Benson, Scott Loftesness, 30 May 2013, http://www.cgap.org/publications/interoperability-electronic-payments-lessons-and-opportunities
3. Account-to-Account Electronic Money Transfers: Recent Developments in the United States, Oz Shy, October 12, 2011, Consumer Payments Research Center, Federal Reserve Bank of Boston, http://www.bostonfed.org/economic/ppdp/2011/ppdp1110.pdf

2.2

Why is A2A interoperability important

Good and Bad Network Effects

Interoperability adds the ability for customers to transact with users in other schemes, increasing the size of the overall payments network. There are a number of studies that assess actual transaction data to show that a positive network effect – referred to as the positive effect of network externalities – applies to payment systems, just as it does for telecoms networks[4]. When applied to mobile money, this would lead to an increase in the number of transactions made in participating schemes, which in turn leads to increased transaction revenues.

As well as the positive network effect, joining an interoperable network can have negative effects due to the competitive threat of substitution – referred to as the negative effect of network externalities – as the differentiation of products on the same network becomes harder for network operators, as well as increasing costs for implementing and operating compatible systems. For telecoms and payments products alike, this can lead to incumbent networks trying to protect their existing business by remaining isolated from other networks, even though there is evidence that, if network externalities are strong, the positive effect is more valuable than the negative impact[5].

The GSMA has published a paper illustrating the benefit of interconnectivity with an analysis of the positive network effect associated with interoperable SMS across mobile networks, and how this may relate to mobile money schemes[6]. Additionally, there is a large body of literature analysing the positive network effect for payments in banking networks.

Evidence of a Positive Network Effect

Empirical studies[7] over the last thirty years or so have helped confirm the existence of the positive effect of network externalities for several types of banking sector payment networks, including ATM networks, Automated Clearing House (ACH) and credit and debit payment cards.

Research into ATM deployments[8] identified positive network effects based on number and concentration of ATMs in specific localities. ATM networks originally started as private networks before coming together into 'networks of networks'. The banks with larger proprietary networks, and who made the biggest investments were found to be slower to join with other network providers than banks with smaller networks[2].

4. Electronic purses, interoperability and the Internet, Leo Van Hove, http://firstmonday.org/ojs/index.php/fm/rt/printerFriendly/1514/1429#v3
5. The Economics of Networks, Nicholas Economides, October 1996, International Journal of Industrial Organization, http://www.stern.nyu.edu/networks/top.html
6. The Case for Interoperability, Neil Davidson, Paul Leishman,, http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2012/06/mmu_interoperability.pdf
7. Payment Systems and Network Effects, Johan Gottfried Leibbrandt, http://www.merit.unu.edu/training/theses/JLeibbrandt.pdf
8. Adoption of Technologies with Network Effects: An Empirical Examination of the Adoption of Automated Teller Machines, The RAND Journal of Economics Vol. 26, No. 3 (Autumn, 1995), pp. 479-501

For A2A interoperability, the most directly comparable banking sector payment network is probably the automated clearing house (ACH). An ACH is a banking sector network that facilitates relatively low value money transfers between customer accounts at different banks. ACHs and their operation and settlement are introduced in Appendix A of this paper.

Research[9] from Federal Reserve Bank of Boston in 2002 found ACH usage passively correlated to adoption by other banks in the local market. Research[10] at US National Bureau of Economic Research in 2006, recognised that the US ACH was underutilised, looked at the reasons why and assessed the positive network effect by modelling changes to both customer and bank costs. From the models created, they found that reducing customer fixed costs would lead to an increase in utility and give a positive increase to bank profits.

Regulation Drives Requirements

Many of the studies into the network effect for payments have been undertaken in conjunction with central banks and as such include potential policy directives that central bank regulators should consider adopting, to encourage and foster growth in electronic payment networks. This is because the wider economy benefits significantly from efficient electronic payments. For example, in the developed market of Canada, IHS Global Insight research[11] (sponsored by Visa) indicated that electronic payments contributed 23% of the $782 billion in cumulative growth of the Canadian economy over a 25 year period to 2010. From this, it is reasonable to assume that central bank regulators will, at some point, want to see A2A interoperability for MMO schemes in their market to set an environment for as strong and stable growth as possible. A key consideration will be for central banks to allow this to be implemented in the most efficient way possible.

Central banks have the responsibility to oversee the efficiency of payments systems and to mitigate systemic risks, which requires visibility of transaction volume and velocity. Consequently, central banks are likely to add additional reporting requirements for interoperable schemes to help with on-going supervision and oversight. This to ensure that any introduced settlement risk between schemes due to interoperability is effectively and actively managed such that it is quantifiable and minimised.

Will Mobile Money Benefit

It is important to note that the benefits of A2A interoperability do not remove the need for the investments required to make individual mobile money schemes successful (i.e. investments in distribution, product development, customer activation and marketing, etc.)[12]. Any benefits are more likely to be for schemes with proven success in a market.

The experience in banking sector electronic payment networks indicates there is a positive network effect from A2A interoperability. As the effect is likely to be directly applicable to mobile money, this has the potential to facilitate substantial growth in the mobile money industry over time. The benefit from a positive network effect is not a 'one-off' occurrence; it remains in force for the life of the service[13].

Helping to improve financial inclusion is likely to be dependent on how interoperability is implemented. Here, the target segment of customers are particularly cost sensitive and any fees introduced are dependent on the costs of the particular A2A interoperability solution that is implemented. The aim should be to avoid additional barriers. Therefore it is essential that the implementation options are fully understood so that informed choices can be made and solution selection undertaken that is appropriate to the target market. One of the key objectives of this paper is to help with this selection process, so that the core characteristics of mobile money – that mobile money is real-time, affordable, low-risk and accessible for all types of users – are all maintained in an interoperable solution.

9. Network Externalities and Technology Adoption: Lessons from Electronic Payments, Federal Reserve Bank of Boston, 2002, http://www.frbsf.org/economic-research/files/wp02-16bk.pdf
10. Quantifying Equilibrium Network Externalities In The ACH Banking Industry, National Bureau Of Economic Research, 2006, http://www.nber.org/papers/w12488
11. The Benefits of Electronic Payments: http://currencyofprogress.ca/files/2012/08/3.2.4-Download-Electronic-Payments-White-Paper-English.pdf
12. Expanding the Ecosystem of Mobile Money: Considerations for interoperability http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2012/10/2012_MMU_Expanding-the-ecosystem-of-mobile-money.pdf
13. For example, this characteristic was identified as a key feature when the business model for faster inter-bank clearing and settlement of retail transactions in the UK was analysed. The analysis stated: "It is also worth emphasising that improvements to payment arrangements, such as faster clearing times, incur a one-off cost of investment in bank systems, but lead to a continuing flow of benefits to payment users. Per annum benefits therefore need to be only relatively small to provide a cost-benefit justification for making the proposed improvement in payment arrangements."

Reducing Barriers to Transact

The key findings to take away from studies into the network effect for bank payment networks are:

- Studies have found empirical evidence that demonstrates the positive network effects of A2A interoperability;
- Banks with large numbers of customers are reluctant to join networks, worrying substitution costs outweigh the positive network effects;
- Customers are very price sensitive, which has resulted in the under-utilisation of certain bank payment schemes in the US as compared to their European equivalents;
- The benefits of A2A interoperability for mobile money schemes would be more likely to apply to more established schemes with a proven business model and stable distribution network and customer base.

These findings are consistent with the GSMA's recent paper [6] on the interconnection of mobile money schemes, which highlighted the need for realistic pricing for inter-scheme transactions. The use of multiple SIM cards is common practice by customers in mobile money markets, and switching SIM cards and mobile money accounts will likely be an alternative way for inter-scheme transactions if A2A interoperability is introduced with a steep cost barrier – albeit more cumbersome for the customers, less appealing to the regulator and without the benefits of positive network effects for the scheme operators.

It may be difficult to conceive of which types of payments would cause customers to take advantage of A2A interoperability between schemes and with banks[14]. However, it is widely recognized that payments are not undertaken for their own purpose but "in order to complete other transactions"[15]. Evidence suggests that reducing barriers for customers across the whole payments network is enough to generate positive network effects that can help raise economic activity and have a positive effect on the profitability of mobile money schemes. By adding A2A interoperability to mobile money schemes, they may become a foundational element of a national payments infrastructure.

Interoperability and Financial Inclusion

In a number of markets, the MMO payment schemes have been successful in increasing financial access and, where successful, this has led to a rise in uptake and usage of formal financial services. Interoperability has the potential to increase uptake further as the ability to transact across different schemes will be available. However, it is equally important that any move to A2A interoperability does not restrict access, eligibility or affordability of services by adding restrictive practices or prohibitive cost to payment schemes.

Having the participating players in the market investigate the implementation options to identify the appropriate option for A2A interoperability for that market is preferable over mandated solutions, which would have a greater risk of being under-utilised or overly costly. The benefits of A2A interoperability in the area of financial inclusion are likely to come into play not immediately but in the longer term, as most options are associated with increased costs for the end customer, at least in the short term.

14. Improving access to mobile money services is one area where interoperability would bring benefits. For an example see http://www.pnas.org/content/109/26/10257.full
15. What's in it for us? Network effects and bank payment innovation, Alistair Milne, Bank of Finland Research, Discussion Papers, 2005, http://www.suomenpankki.fi/en/julkaisut/tutkimukset/keskustelualoitteet/Documents/0516netti.pd

3

OPTIONS TO ACHIEVE A2A INTEROPERIBILITY

3.1

Identifying possible options

This section introduces the most likely implementation options that should be considered for achieving A2A interoperability between mobile money schemes and between mobile money schemes and banks. For each approach identified, a summary is provided with its strengths and weaknesses for the participating MMOs.

In order to be able to evaluate fully the most appropriate approach, the market context for a deployment must be taken into consideration. The next section of this document presents an evaluation of the potential options for different market contexts, as each implementation option has consequences for participating mobile money schemes.

The implementation options described in this section are:

- Bilateral agreements between schemes and banks;
- Neutral processor between schemes and with banks;
- Commercial processor between schemes and with banks;
- Using a bank and a national ACH to interface with other banks;
- Direct connectivity to national ACH for all schemes and banks;
- Commercial processor for bank interface, bilateral between schemes.

The above options are described using overview diagrams to illustrate connectivity between participants. **In the diagrams blue lines are used to indicate transaction flows and red lines settlement flows. Note that settlement (the flow of 'real' funds) would occur between bank accounts belonging to the participant MMO.** For settlement participants need to be able to reconcile the flow of funds into their bank account with the flow of e-money associated with the transaction. This detail is not shown in the diagrams.

3.2

Bilateral agreements

The simplest approach, in terms of understanding, is to mirror existing mobile money agent, or company, relationships but apply them to other mobile money schemes and banks using bilateral connectivity and agreements.

Both mobile telecoms and banking industries have considerable experience in building bilateral agreements for interoperability. Bilateral agreements are often used for roaming relationships between mobile network operators and are not uncommon in interoperable banking sector payments schemes. For example, in Canada and Australia electronic funds transfer payment card schemes for POS retail payments operate on bilateral agreements between networks acquiring and issuing parties.

This approach is illustrated here:

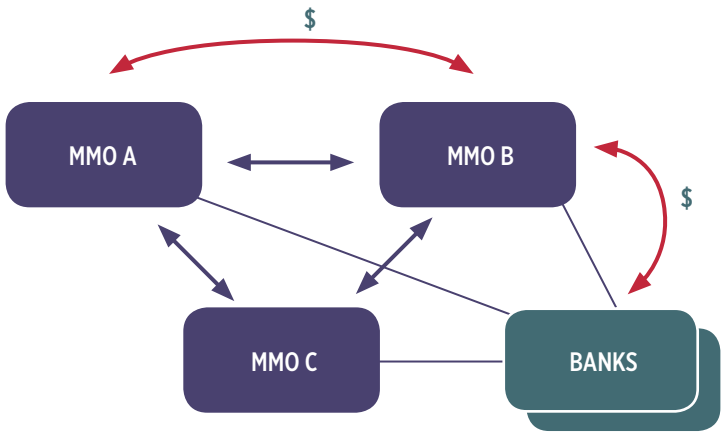

Figure 1: Bi-lateral Agreements

STRENGTHS	WEAKNESSES
Relatively easy to deploy	Complexity increases with number of parties
Existing account management processes	Each MMO needs to connect to all parties – duplicating efforts
May be able to re-use an existing framework for banks	Increases complexity of maintenance over time
Enables net settlement (by agreement)	
Control over feature enablement	
Control over interface standards	

Table 1: Bilateral Agreements Strengths and Weaknesses

The biggest potential drawback with this approach is scalability – how is the complexity of many-to-many relationships to be managed if the number of participant grows. There are two different potential issues here:

A. MMO account to MMO account connectivity should not be an issue. In most markets, there are only a small number (typically, less than five) of mobile money schemes and as such a relatively small number of bilateral agreements need to be agreed. So, scalability of bilateral agreements for MMO schemes should not be a problem;

B. By contrast, connectivity to banks may be an issue, since there often are many more banks in a market than MMOs. This may create significant integration overhead. However, if the interface to banks is standardised across all schemes, connectivity can be made to be relatively straightforward.

A strategy to mitigate this issue would be to consider a single 'connect point' for MMOs to interact with the conventional banking network, leaving inter-MMO transactions for bilateral agreements. This option is explored further in the section below entitled 'A single Bank and National ACH to interface to all Banks'.

3.3

Neutral processor

The neutral processor approach envisages creating an entity that is jointly owned by the all participating MMOs, operating a single-point switch which routes traffic between the separate mobile money deployments and offers a single connection to external banking partners.

This approach is illustrated below:

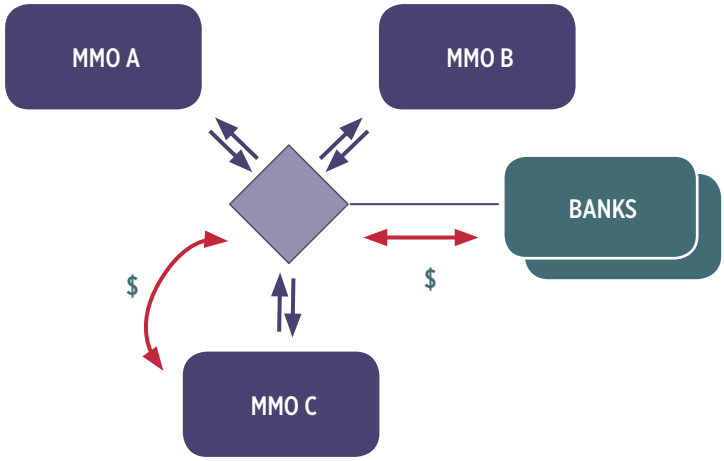

Figure 2: Neutral Processor

STRENGTHS	WEAKNESSES
Scalable Each MMO gains access to all external parties who connect to processor, and vice versa Control over feature enablement Control over interface standards	Time consuming to incorporate processor joint venture New settlement approach required – may have unknown risks May add additional transactions costs New operational rules required Time scales for agreement on technology and approach Transaction reversal requests may be harder, as there is no specific contract between MMO and recipient's bank

Table 2: Neutral Processor Strengths and Weaknesses

The idea of a single neutral switch may initially seem to be a good approach for connectivity to banking networks, as it reduces the number of connections needed, but, by contrast, if there are a low number of MMOs, it may be overly expensive and time consuming for MMO interconnectivity.

The settlement model between participants would require two stages: settlement between one participant and the processor; and settlement between the processor and the corresponding participant. Typically MMO payments are real-time transactions using e-money that is matched by cleared funds in a trust account at a bank. This may not be the case for all transactions through the processor, thus this introduces settlement risk that requires consideration in the technical solution and operational service. This new, two stage model for settlement may delay deployment and may lead to additional risks.

The definition and control of the operational rules, transaction processing and settlement requires the active involvement of all participants in the neutral switch. In relatively new markets and markets that have MMO schemes with significantly different levels of maturity, ensuring that the operation of the joint venture gives an equal and non-exclusive, 'level playing field' to all participants will be essential. This will require oversight, the body for which may be difficult to identify and potentially costly to engage.

3.4

Commercial processor

This approach aims to reduce time to market by contracting a commercial entity to manage the routing of transactions and to handle clearing and settlements across multiple MMO scheme providers and financial institutions.

This approach is illustrated below:

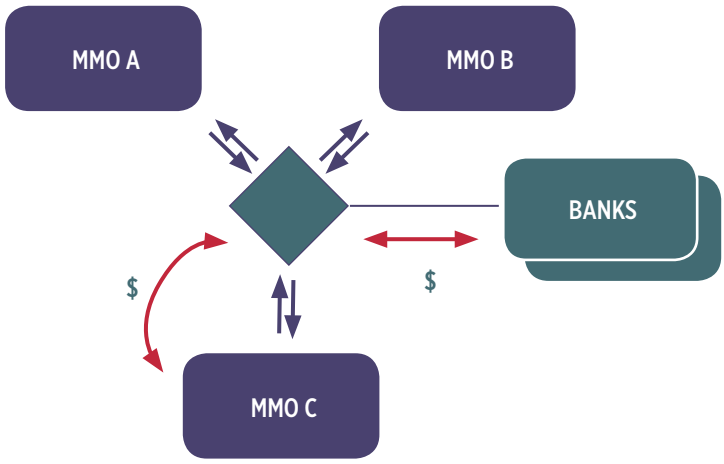

Figure 3: Commercial Processor

STRENGTHS	WEAKNESSES
Scalable Each MMO gains access to all external parties who connect to processor, and vice versa May be faster to deploy than neutral processor Mature systems may improve reliability and contribute with established processes	New operational rules required Unknown additional transactions costs added by commercial third party New settlement approach required – two stage settlement has unknown risks Loss of control for MMOs (on price, connections, innovations etc.) Transaction reversal requests are much harder, no specific contract between MMO and recipient's Bank

Table 3: Commercial Processor Strengths and Weaknesses

The option to use a third party processor should be faster to market than creating an MMO scheme-neutral processor – but it is likely to be more expensive on a per transaction basis. It will add costs to each transaction that could significantly affect the attractiveness of inter-scheme mobile money interoperability to customers, especially unbanked customers.

When the average transaction value for mobile money is of the order of a few tens of dollars, adding a commercial processor could adversely affect transaction cost (for example, assuming fees similar to debit cards) for the lowest value transactions, which would act to significantly stifle the potential benefits of A2A interoperability.

3.5

Partner bank to national ACH

In this option, the MMO schemes inter-connect directly to each other, through bilateral agreements (as in the first option 3.2), but inter-connect to the banking sector through a single partner bank relationship. The bank partner relationship is then used to connect through to the remaining banks through the national ACH.

As typically all banks connect to the ACH for bank account to bank account transfers, this facility would be used by the partner bank to convert mobile wallet e-money to 'real' banking system money before making a transfer from a scheme bank account to the recipient's bank account at another bank – and vice versa for bank account to mobile wallet e-money. If the recipient's bank account was with the partner bank, the ACH would not need to be used for the transfer.

It is worth noting that in some markets a national ACH may not exist and that lower value payments between banks may be carried out using bilateral agreements between banks. In this case, this option may still be appropriate as an agreement with a single bank should be enough to allow transfers to all other banks.

This approach is illustrated below:

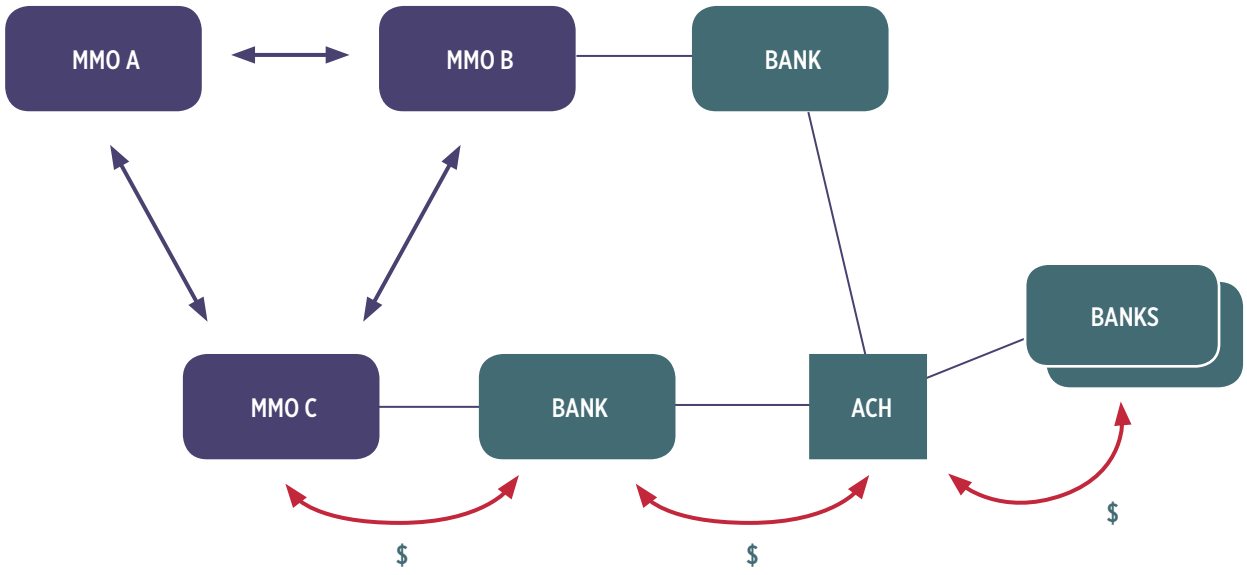

Figure 4: Partner Bank to National ACH

STRENGTHS	WEAKNESSES
Relatively fast to deploy Bank integration becomes simplified Banks would process mobile money transactions through ACH as a standard bill payment (needs validating) Extension to existing framework between MMO Schemes and partner Bank ACH may be cheaper than a commercial processor for banks	Very low value transactions are not currently routed through ACH – unknown impact Mobile money transactions would be included with other bank transactions for settlement, may be more time consuming to reconcile and audit May introduce additional costs both from partner bank and ACH (over time) Transaction reversal requests are much harder, no specific contract between MMO and beneficiary Bank Unknown ability of ACH to handle additional transaction volumes User experience for sending money from bank account to mobile wallet account is undefined ACH may not be real time – which introduces settlement delay associated with overnight or intraday settlement for scheme to bank transfers

Table 4: Partner Bank to National ACH Strengths and Weaknesses

This approach may be faster for MMO schemes to reach all bank accounts than the bilateral agreements approach introduced previously. However, there are significant elements of the approach that are undefined, or depend on the market context, so this approach represents an increase in risk relative to other options.

3.6

Direct connectivity to national ACH

In this option, the MMO Schemes would connect directly to a national ACH scheme, submitting transactions directly without using a partner bank. This would aim to enable all transactions, including inter-scheme e-money transactions, to be passed through the ACH.

The ACH scheme would need to change to allow references for mobile money wallet accounts as well as bank accounts.

This approach is illustrated below:

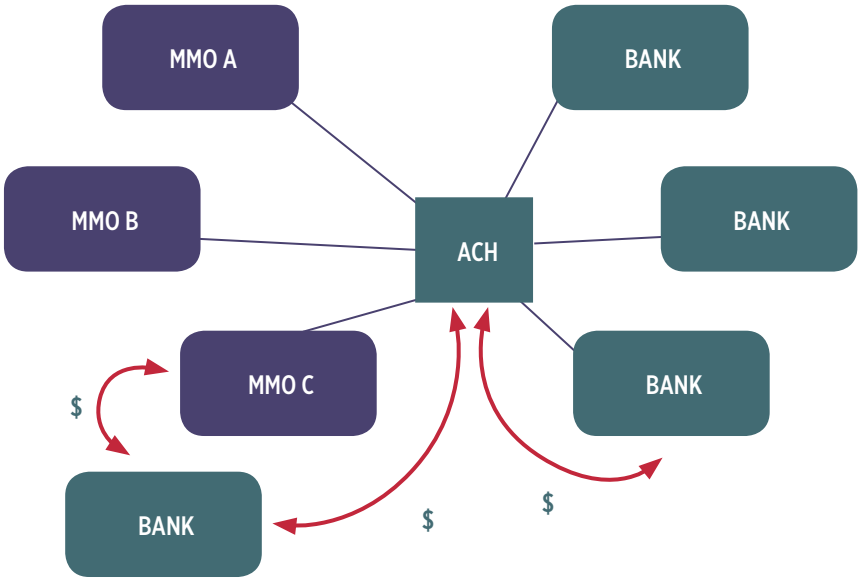

Figure 5: Direct Connectivity to National ACH

STRENGTHS	WEAKNESSES
Inter-scheme and Scheme to/from Bank integration simplified Inter-scheme settlement through central bank reserve accounts Direct connection may be required by the central bank as the volume of inter-scheme transfers grows over time	Very low value transactions are not currently routed through ACH – unknown impact Partner bank required for settlement – may introduce additional costs User experience for sending money from bank account to mobile wallet account is undefined Unknown ability of ACH to handle additional transaction volumes ACH may not be real time – settlement delay associated with intra-day settlement through the ACH A banking sector ACH is typically not designed to refer to accounts using the mobile phone number ACH rule book not designed to allow for mix of 'real' money and e-money Control resides with the members of the ACH, not MMO Schemes

Table 5: Direct Connectivity to National ACH Strengths and Weaknesses

From a technical architecture point of view, this approach appears to be the simplest – a single interface to an existing service. However, the rules and interfaces for a banking sector ACH are not designed to allow for e-money to be cleared. Changes to allow this would require agreement with the banking sector and the central bank.

3.7

Commercial processor for bank interface

In this option, the MMO schemes inter-connect directly to each other, using bilateral agreements (as in the first option above), but inter-connect to the banking sector through a single commercial processor. This may be appropriate where an existing organisation runs a payment network in the market, such as an ATM network operator.

If the commercial processor has relationships with all banks in a market, and processes transactions similar to the required credit transfers (e.g. bill payments), then this approach may offer a relatively quick route to market.

This approach is illustrated below:

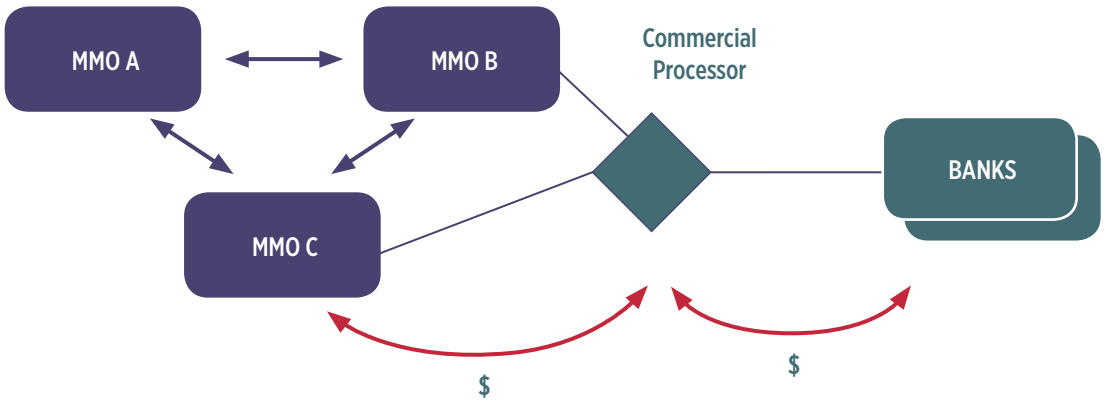

Figure 6: Commercial Processor for Bank Interface

STRENGTHS	WEAKNESSES
Scalable where scale is needed (i.e. interfacing to banks) Each MNO gains access to all external parties who connect to processor, and vice versa Bank integration simplified	Loss of control for MMOs on interface to banks; on price, connections, innovations etc. Unknown additional transactions costs added by commercial third party New settlement approach required for bank transfers Transaction reversal requests are harder as there is no specific contract between MMO and recipient's Bank Danger of function creep to include inter MNO scheme transactions – and subsequent loss of control in that area User experience for sending money from bank account to mobile wallet account is undefined, requires bank agreement

Table 6: Commercial Processor for Bank Interface Strengths and Weaknesses

The option to use a third party processor for bank transfers may be faster to market than direct to integration through banks to the national ACH or individual bilateral agreements with banks. However, it will add costs to each scheme-bank transaction that could significantly affect the attractiveness to customers of this aspect of A2A interoperability.

The rules and interfaces, for an existing banking sector commercial processor, are not specifically designed to allow for e-money to be cleared with bank account money, requiring new rules to be defined. For example, what would be the settlement process and timing for transactions?

As third party networks are closely tied into the banking systems, the changes necessary to the commercial processor network to allow for this functionality are likely to require agreement with the banking sector and the central bank. This may add commercial risk (e.g. cost) which slows down integration. Transaction costs are also a potential barrier to the effectiveness and utilisation of the system, as new costs will be introduced and likely passed to the end customer.

4
CHOOSING AN OPTION

4.1

Assessment criteria

In order to decide which of the implementation options introduced above may be most appropriate for a market, an assessment of how each option maps onto the key drivers and barriers for A2A interoperability may be undertaken. This provides a framework for assessing the relative suitability of each implementation option for the specific conditions of a market.

It is worth noting that all of the options in Section 3 above can be used to provide A2A interoperability given enough time and money. This assessment aims to provide a simple tool that can be used to screen and select a small number of the most appropriate options (relative to the other options), which may then be considered in more detail to fully understand their requirements and implications.

The assessment framework uses the following criteria against which an implementation option is scored:

A. Risk Impact;

B. Implementation Complexity;

C. Transaction Cost Impact;

D. Regulatory Framework;

E. Agreement Framework;

F. Scalability;

G. User Experience;

H. Time to Market.

ASSESSMENT CRITERIA	KEY QUESTIONS TO BE CONSIDERED FOR EVERY CRITERIA, FOR EACH IMPLEMENTATION OPTION EVALUATED
A. RISK IMPACT A key consideration for all new payment systems is whether the introduction of the service brings new systemic and fraud risk. This element in the assessment is used to assess the impact of an implementation option in terms of the new risks introduced through A2A interoperability.	• Are risks known and understood for both inter-scheme A2A and scheme to bank A2A transaction clearing and settlement? • Are new settlement rules required? • Are real-time settlements available? If not, what is the settlement cycle? • Do settlements rely on third parties? Is their risk known? • Does the central bank have visibility of inter-scheme and scheme-bank settlement? • Are significant new controls and reporting required?
B. IMPLEMENTATION COMPLEXITY The cost of implementing A2A interoperability can be a significant barrier to its deployment in a market. It is generally impractical to calculate exact implementation costs in the initial stages, and so at the screening stage for the options a relative assessment of the complexity of implementing A2A interoperability is an appropriate proxy for cost – allowing a direct comparison of a number of options. An assessment of the implement complexity of an option will relate directly to its barriers to deployment in a market.	• Are common interface standards (e.g. APIs) required to be defined for inter-scheme or scheme-bank interfaces? • Is there a suitable existing payment system (e.g. ACHs & RTGS) that can be used to provide A2A connectivity? • Does the existing processor operate in real-time for transaction authorisation and real-time or periodic for settlement? • Are changes required to the specifications and interfaces of an existing payment system? • Can the existing payments systems process potentially very large numbers of low value transactions without affecting its current processing requirements? • Is there the potential to use an existing third party processor? Do they provide open APIs for integration?
C. TRANSACTION COST IMPACT As well as implementation costs, another potential barrier to the implementation of A2A interoperability using a specific option may be any additional transaction processing costs that option requires.	• Are the additional transaction processing costs likely to be significant when compared to existing mobile money transfer transaction costs? Will this make the A2A products uneconomic? • Are the additional processing costs under the control of a banking sector party? Are these processing costs subject to regulation? • Are the additional processing costs under the control of a commercial third party? • Are future transaction processing costs for A2A interoperability quantifiable or unknowable at this stage?
D. REGULATORY AND POLICY FRAMEWORK It is important to understand the requirements and constraints of any existing regulation for A2A interoperability between schemes. This knowledge should highlight the potential barriers to entry there may be that are caused by regulation in a specific market. Equally, a lack of clarity as to the requirements of the regulator may restrict the opportunity to provide A2A interoperability. Therefore due diligence of the existing regulatory framework is necessary. This assessment element also allows consideration of the potential competition from other networks.	• What are the objectives of the regulator for the development of the ecosystem? Is there specific regulation defining the requirements and constraints of A2A interoperability between schemes? Are these regulations mature, specific and consistent? • Are mobile money schemes required to support other specific functionality (such as POS interoperability) that would necessitate working with a specific third party, therefore limiting choice of implementation option? • Do regulations define the cost model for A2A interoperability? Will this model significantly affect the choice of implementation option? • Is the license given directly to the scheme operator (to the MNO) for the mobile money scheme? If not, a partner bank with a license has significant input in the path going forward. • In addition to regulation for mobile money payments, what other regulations - such as consumer protection or Anti-Money Laundering and Combating the Financing of Terrorism (AML/CFT) - are likely to influence the selection of a specific deployment option? Are these regulations well-established, clear and consistent across the related areas?

ASSESSMENT CRITERIA	KEY QUESTIONS TO BE CONSIDERED FOR EVERY CRITERIA, FOR EACH IMPLEMENTATION OPTION EVALUATED
E. AGREEMENT FRAMEWORK This assessment element is used to score the ability of the mobile money operators participating in A2A interoperability to define, influence and control the operating rules and technical specifications of the services provided. It is important that significant control is exercised by MMOs to ensure that service delivery costs can be controlled over the longer term.	• Does an option allow existing and understood agreements to be used for MMOs participating in inter-scheme A2A interoperability and/or scheme-bank A2A interoperability? • If an option required the creation of a new service organisation, would this be under the control of MMOs? • Is the control of service agreements mixed, with some under MMOs' control and some under banking sector or third party control? • Are agreements under third party control subject to regulation that would restrict the controlling organisations ability to dominate the rules within the agreement? • Is the agreement framework and future model unknown at the current time? If so, does this represent the introduction of significant risk if the option was selected?
F. SCALABILITY As well as directly influencing deployment costs on implementation, scalability is an assessment of the flexibly of an implementation option to cater for changing numbers of participants and, ultimately, end users. For example, if there is a large banking sector (with hundreds of banks) bilateral agreements may be expensive to implement and maintain across even a small number of mobile money operators.	• Does an implementation option require individual agreements for all MMOs and bank participants? Or just MMOs? • Can the option easily scale to allow for the participation of many hundred of banks?
G. USER EXPERIENCE It is important not to lose sight of the need for convenience and ease of use for payment transactions, as these are key drivers for customers. Any implementation option should deliver these factors along with cast-iron reliability and risk-free settlement. Generally, settlement works best for customers when it is undertaken in real-time, as is usually the case in mobile money services. Banking services may not settle transactions in real-time. A less tangible driver, perhaps, may be the ability to include a richer set of transaction data and services that can be used to enhance the user experience. For example, it may be useful for a sending party to be notified of the name associated with the target account number (providing privacy concerns are addressed).	• Is the settlement process defined and understood such that it is straightforward for customers? • Is settlement provided in real-time for all A2A transactions? Or just for some A2A transaction types? • Does the implementation option require a complicated or unreliable transaction experience, or new registration with significant compliance requirements? • Does the implementation option include the ability to add metadata to transactions? Does it allow for the introduction of new transaction types, such as transaction reversals?
H. TIME TO MARKET The ability to deliver a solution for A2A interoperability in a relatively short timescale may be necessary to satisfy the commercial goals of the participants or to meet the requirements defined in regulations. Identifying the key driver behind the push for A2A interoperability will help determine what the target timescale for deployment should be. This element is used to assess if this driver is best met through one implementation option or another	• Do regulations for interoperability specify a timescale that can be met by the implementation option? • Are there timescales driven by commercial goals (i.e. competition from other networks) that can be met by the implementation option? • Does the implementation option require significant integration effort for banks, which may lead to delays? • Would the creation of shared or joint services, if required, prove time consuming? • Are agreements with third-party service providers or processors likely to be straightforward, acceptable to all participants in delivering A2A interoperability and relatively fast to sign? • Is agreement required with central bank and the banking sector? Is there an appropriate banking sector organisation that represents all banks?

4.2

Undertaking an assessment

By considering each of the above areas for each implementation option identified and applying a simple scoring mechanism for each of the assessment criteria, a relative assessment can be put together that illustrates the suitability of each option with regards to the characteristics of a particular market. This is a good way to quickly see which options are of interest, and to screen out unsuitable options at an early stage allowing a more detailed analysis of a small number of options.

To illustrate how an assessment may be undertaken, and to show that the market context is likely to affect the outcome of the assessment, two worked examples are presented in Appendix A. The examples are both for markets where mobile money schemes are mostly run by a single organisation (in many markets this is a single MNO). The first example is a market where the MMOs are looking to deploy A2A interoperability where the retail payments market is concentrated on a small number of banks; while the second example is a market where the MMOs are looking to build interoperability in a more mature and competitive retail payments and banking market.

These examples illustrate where bilateral agreements between different MMOs make sense and where selection of a central processor to connect many parties may be appropriate. They show that different implementation options are likely to be suitable for different types of markets, highlighting that the payments landscape within which interoperability is desired is an important influence on the choice of option.

The framework presented here provides a structured approach that allows an assessment of the strengths and weaknesses of potential implementation options to be made for any market. This helps to understand the most appropriate deployment approach and be able to identify key cost elements that will influence the business case for A2A interoperability.

5
CONSIDERATIONS FOR BUILDING THE BUSINESS MODEL

5.1

Basic elements of the business model

The cost elements of A2A interoperability depend, to a considerable degree, on the implementation option selected. As exact costs are dependent on this choice (and relate specifically to an individual market that may be different for every deployment) it would not be appropriate to give values for a business model here. As such, this section focuses on the characteristics of the value proposition that underlie a business model.

It is important to bear in mind that the majority of the resource costs to implement interoperability are one-off, while the network effect benefit remains for the life of the service.

5.2

A2A value proposition

The following table introduces key elements of the business model associated with interoperability for participants throughout the mobile money value chain.

STAKEHOLDER	VALUE PROPOSITION	SUCCESS FACTORS
CUSTOMER – CONSUMER	• Increase in opportunity to transact • Increase in convenience • Potential to remove the need to have multiple MMO subscriptions • Price sensitive but open to incentives	• Simplify the customer experience for cross-scheme transactions • Affordable pricing for cross-scheme transactions to encourage usage • Real-time transactions cross-scheme
CUSTOMER – SME[16]	• Increase in opportunity to transact with other SMEs and customers • Improved acceptance, ability to accept more sales through mobile money or bank account transfers • Substitute A2A payments for other payment mechanisms (such as cash, cheque, cards) to reduce acceptance costs • Potential to remove the need to have multiple MMO subscriptions	• Affordable pricing for cross-scheme transactions to encourage usage • Useful reports and visibility over all transaction types • Real-time transactions cross-scheme and cross-bank transactions
MOBILE MONEY OPERATOR	• Potential for increasing account-to-account transactions, meaning increased revenues • Increases customer utility (increases the 'demand-side' push) • Opens new business opportunities, especially attractive for new acceptance points, such as retailers (improves attractiveness to the 'supply-side' pull)	• Sufficient quality of service among all participating MMOs to ensure that convenience attribute is achieved. • Define commercial model that encourage cross-scheme transactions. • Agreement framework to handle know and future exceptions and customer care issues

16. Although mobile money is often promoted as a means for the low-income segments in a society to send and receive funds (from working family members or government disbursement) and to manage their money, it is equally about providing a stimulus to the small/medium enterprise (SME) sector. Research by the GSMA "Getting the most out of your data" shows the importance of SME mobile money users: http://www.gsma.com/mobilefordevelopment/new-mmu-data-analysis-aimed-to-accelerate-customer-adoption

STAKEHOLDER	VALUE PROPOSITION	SUCCESS FACTORS
BANK	• Potential for increasing transactions, for example for Bill Payments • Increases utility of payments for existing customers • Opportunities for cross-selling / up-selling products (e.g. savings and loans) • Potential of conversions into current accounts	• Agreement framework to handle know and future exceptions and customer care issues • Reduce friction for bank-scheme transactions in terms of costs, user experience, etc.
CENTRAL BANK	• Better opportunities to understand and manage system risk • Potential to act as the settlement institution	• Increased visibility: appropriate reports and measures to monitor any introduced risks • Increased efficiency through greater use of electronic payments options

Table 7: Stakeholder Value Proposition

The above table is an introduction to the potential benefits of interoperability for MMO payment schemes and the different stakeholders. A key uncertainty for existing MMO payment schemes is that the potential benefit would not materialise and the worry that "the adverse substitution effect will not be smaller than the network benefit"[4]. During the research for this document, direct evidence of this effect has not been found, either for mobile money or for banking sector payments schemes.

The key costs associated with A2A interoperability can be summarised as:

- **One-off technology costs –** associated with the design, development and testing of connectivity between schemes, including the changes required to mobile money host systems for the servicing of inter-scheme transactions;
- **Inter-connection costs –** whether the implementation option chosen is for direct bi-lateral agreements or through a centralised transaction processing service, the additional costs introduced should not be so high as to diminish the attractiveness of inter-scheme transfers across the spectrum of mobile money users. If one of the goals of interoperability is to improve financial inclusion, then transaction costs are a particularly sensitive element of the service;
- **Operational costs –** the majority of which may be associated with servicing customers who make incorrect transfers between accounts in different schemes. This is recognised as a key customer care cost for mature mobile money schemes where transfers are only available between its own accounts. Adding the ability to transfer funds externally to the scheme means that the problems with incorrect transfers could be magnified and made more complex. It is important that consideration for this type of 'exception transaction' is discussed and an approach agreed early in the lifecycle of any A2A interoperability programme.

In the GSM business model, operators decided on a commercial agreement where the operator receiving a call or a text is entitled to a termination fee set by that operator. In high pre-paid markets, this has resulted in extensive on-net use through customers using multiple SIMs to avoid these extra costs. In mobile money, there is an opportunity to explore other commercial models, models that instead would encourage cross-scheme transactions.

6
HOW TO MOVE AHEAD

6.2

Key activities

A2A interoperability requires collaboration between competing commercial companies. Getting competing companies to work together successfully requires effective organisation, and getting these collaborations to deliver and evolve requires effective leadership and governance. One of the most common and effective means of achieving this is through specially set up, dedicated industry groups (often referred to as steering boards or task forces) that are charged with agreeing and implementing policies. This approach will be similar, on a high level, for industry collaboration and other transaction types wanted to be made interoperable.

Esablishing an industry forum, or task force, is the key platform for industry collaboration going forward. This is the first step as it creates the forum where the the most appropriate implementation option can be selected and the steps needed to bring services to market can be agreed.

The following activities should be considered to define the goals for A2A interoperability and how the industry will meet its own requirements and those of the regulators:

Get organised: Establish an industry forum

Governance of a collaborative approach can be achieved through the creation of an industry forum, a Task Force. The Task Force is a forum in which participants can work together to develop the appropriate business, technical and operational approaches.

An example Terms of Reference for an Interoperability Task Force is presented in Appendix C.

Determine functional scope and objectives

The high-level business requirements for A2A interoperability should be determined to describe what the scope of interoperability is in terms of the functionality supported and the objectives of implementation. There is likely to be a combination of sources for requirements, from the requirements and constraints defined by regulations to the commercial concerns of participants. Likely the providers will establish an ongoing dialogue with the regulator to undertake the due diligence of the regulations and to make sure that the work of the Task Force and the policy objectives and expectations are aligned.

Evaluate interoperability options

This activity aims to identify, and enable participants to agree, the structure that is the most efficient and cost effective approach for the mobile money and payments industry. The preceding sections in this document have presented a list of key discussion points and presented an assessment framework that can be used to guide the evaluation process.

Agree the approach

Following the evaluation of options, outline agreements for interoperability between MMOs and between MMOs and banks, and a collective understanding of the way forward, can be agreed. This will outline technical, operational and risk management, including settlement and reconciliation practices, which should be discussed with the regulator and formally agreed between participants.

Develop the business case

Once the desired approach has been identified and agreed, the parties involved need to define the commercial details of the approach and a business model that is sustainable for all involved parties.

Agree approach with regulators

Once the industry participants have ratified the proposed approach, it is likely that it will need to be discussed with the payment systems regulator.

Once agreement of the approach has been reached, detailed planning and specification work can progress.

The work in this phase could be separated into technical and operational/commercial workstreams.

The technical workstream will define the technical implementation for the chosen option, the technical service level requirements and the design of the standard interfaces that need to be created.

The operational and commercial workstream will define target pricing models, operational procedures (such as fraud and risk mitigation and customer care), and the formal agreement between the participants, including service level agreements.

Potential activities in this phase include:

Formalise Task Force and plan workstreams

Following agreement of the approach with regulators, formal sign-off and commitment to continue should be gained from each participating organisation. In order to achieve this, an activity plan for Task Force collaboration, with an accurate understanding of the resources required, should be created for socialisation within participating companies. Naturally, internal resource commitments will need to be understood in addition to the commitments to Task Force work.

Define functional and service level requirements

Once agreement to proceed has been achieved, the first activity is to refine the business requirements determined in an earlier activity and define the more detailed functional and service level requirements for the participants. These requirements and processes will feed into both technical and operational workstreams and will allow traceability and reference points for acceptance testing of the implemented solution.

Consideration will be required for the following areas of functionality:

A. Inter-scheme mobile money transfers;
B. Mobile money and bank transfers;
C. Transaction queries and reversals;
D. Settlement and reconciliation;
E. Financial and regulatory reporting;
F. Risk management and fraud reporting;
G. Collaborative customer care.

Collaborate to define standard interfaces

An objective for commercial interconnected systems is to minimise implementation cost and on-going operational overheads for all parties. Connections between systems should aim to be implemented using an agreed standardised approach, and interface specifications should aim to be based on international standards where appropriate. A key exercise for the Task Force is to develop and agree appropriate technical interface specifications.

Define collaboration for operational procedures

This Task Force workstream will define those cross-organisation operational procedures that need to be aligned. The objective here is to ensure that inter-scheme payments can be reconciled across organisations for all transactions, successful or otherwise. For example, it may be necessary to align customer care processes for transactions across schemes, to ensure that transaction exceptions can be handled efficiently and that the required levels of consumer protection can be achieved.

Collaborate on fraud & risk mitigation

As with any payment network, it is imperative that risks are understood and can be managed effectively. To help participants achieve this, an element of information sharing in live services may be required. A key activity for the Task Force will be to develop an understanding of the likely risk and exposure, and to recommend policies and procedures for operational services. This may lead to a formalised risk management framework for the industry to help combat fraud and meet anti-money laundering requirements, as well as fostering best practice in participants.

Determine commercial element of agreements

Elements of the commercial agreements between participants may need to be collaborative, depending on the implementation option selected. For example, the commission and fee structures for transactions may be agreed centrally, if a commercial processor is used. Additionally, settlement and reconciliation practices need to be formally agreed between MMOs and banks, as well as with the regulator.

Draw-up formal agreements between participants

At this point in the process, the Task Force will have defined and agreed, in principle, the collaborative aspects (i.e. the technical and operational approach) for A2A interoperability in their market. Formal agreements between participants can now be entered into and development work streams kicked off.

7

CONCLUSION

This discussion paper presents a framework to evaluate A2A interoperability implementation options through industry organisation and collaboration.

A2A interoperability is likely to be positive

As presented in this paper, there is significant evidence from interoperable banking sector payment networks to suggest that A2A interoperability between different mobile money schemes and between mobile money schemes and banks should offer positive network effect benefits for all participants, especially in established mobile money markets.

How best to achieve A2A interoperability depends on local conditions

There are a number of implementation options covering the interconnection of both mobile money schemes and banks. These range from bilateral agreements between parties to a single central processor using an existing national banking service (such as an ACH) adjusted to include mobile money (e-money) in its clearing and settlement operations.

As each implementation option for A2A interoperability is likely to position the mobile money industry in a slightly different way – in terms of influence over impact on pricing, governance and operational procedures. – the choice of implementation option should be made based on strategic considerations, in addition to technical considerations. Having a real-time and low-cost A2A implementation is possible, and the purpose of this paper is to help the industry to identify the most efficient solution and governance structure to enable it.

Interoperability needs a collaborative approach

The most appropriate solution for one market is not necessarily the same for all markets. Therefore, this document presents an assessment approach that enables stakeholders to reduce the set of potential deployment options to a small number, which are most suitable for their market conditions, for more detailed consideration. The assessment approach uses a simple matrix framework for scoring each option against a set of relevant criteria, to describe what is known in the target market. This approach rapidly allows the most promising options to be identified for further analysis, and helps explain why other options are not suitable for particular local market conditions.

As A2A interoperability requires collaboration between commercial companies, getting companies to work together successfully requires effective organisation and getting collaborations to deliver requires effective leadership and governance. The first step towards successful collaboration is for all stakeholders to agree to work together. One of the most effective ways to start this process is to form a dedicated Working Group or Task Force. This paper includes a template terms of reference for such collaboration, and puts forward an initial set of activities to kick-start interoperability work.

Cost to customers need to be proportionate

While working towards A2A interoperability, it is important to keep in mind that any additional costs introduced for inter-scheme transfers must be at a level suitable for the target market, especially if mobile money is to continue to spear-head financial services to low-income and currently financially excluded segments of society. Further, incorrect cost structures have resulted in under-utilised payment schemes in the banking sector and it is likely that the same situation would occur for mobile money. A key element of cost management will be the choice of deployment option and implementation of functionality to reduce potential operational overheads when problems do occur.

GSMA ready to support industry initiatives

To encourage the selection of the most suitable implementation option from the perspectives of both customers and the participating organisations in a specific market, the GSMA is providing support to establish local industry forums, with the purpose to enable the industry to investigate pathways towards a sustainable interoperability implementation – commercial and technical solutions that will allow clearing and settlement across schemes without losing the positive attributes of mobile money that has made it successful so far. The GSMA may also support the industry forums by facilitating the dialogue with the regulator, due diligence of existing regulatory frameworks, and legal assistance in the formulation of the agreements between the participants in the implementation.

8

ABOUT THE AUTHORS

GSMA Mobile Money for the Unbanked

The Mobile Money for the Unbanked (MMU) programme supports mobile money services to reach scale. Through close engagement with mobile money providers, we identify and share benchmark data, operational best practices, and commercially-viable interoperability approaches, as well as cultivate enabling regulatory environments. The MMU Programme is supported by The Bill & Melinda Gates Foundation, The MasterCard Foundation and Omidyar Network.

The GSMA represents the interests of mobile operators worldwide. Spanning more than 220 countries, the GSMA unites nearly 800 of the world's mobile operators with 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in industry sectors such as financial services, healthcare, media, transport and utilities. The GSMA also produces industry-leading events such as Mobile World Congress and Mobile Asia Expo.

Consult Hyperion

Consult Hyperion is an independent consultancy, based in the UK and US, specialising in secure electronic transactions. We help organisations around the world exploit new technology for secure electronic payments and identity transaction services.

Consult Hyperion's Mobile Money Practice offers substantive, experience-based mobile money consultancy services from a team of people with extensive experience of delivering results in mobile money solutions across emerging markets.

Consult Hyperion has been active in mobile money since the technology's earliest days when we were engaged by Vodafone to assist in the development of the M-PESA service starting in 2004. Our Mobile Money Practice is able to offer the expertise of some of the most experienced people in the sector, several of whom worked on the initial pilot and launch of M-PESA in Kenya and have since gone on to support many other new mobile money services in Africa and Asia. We have also worked on European mobile financial services, with their differing technical and commercial requirements.

Appendix A - Assessment Examples

A.1

UNDERSTAND THE MARKET CONTEXT

As different implementation options are likely to be suitable for different types of market, it makes sense to consider the payments landscape, both by industry composition and existing financial infrastructure, in which operability is to be implemented.

A2A interoperability provides the ability for customers to undertake direct credit transactions between MMO accounts and between MMO accounts and bank accounts. Therefore, it is reasonable to segment the market by to considering two dimensions corresponding to the MMO and banking sectors.

For example, an approach to market segmentation might consider:

The number and concentration of mobile money schemes; against

The competitiveness and complexity of the retail banking sector.

This landscape categorisation is illustrated below:

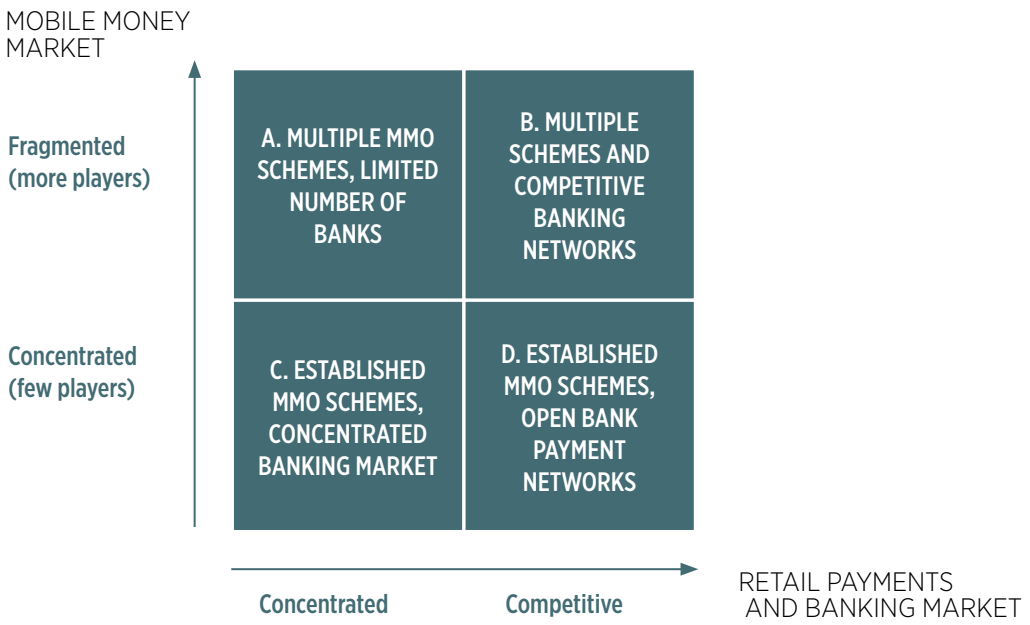

Figure 7: Simple Categorisation of Market Types

A.2

UNDERTAKING AN ASSESSMENT

By considering each of the assessment areas given in Section 4 above for each implementation option identified in Section 3, a relative assessment can be put together that illustrates the suitability of each option in regards to the characteristics of a particular market. This is a good way to quickly see which options are of interest, and to screen out unsuitable options at an early stage.

Different implementation options are likely to be suitable for different types of markets, meaning that the payments landscape within which interoperability is desired is an important influence on the choice of option. To illustrate how an assessment may be undertaken, and to show that the market context is likely to affect the outcome of the assessment, two examples assessments are presented below.

The examples are both for markets where mobile money schemes are mostly run by a single organisation (in many markets this is a single MNO). The first example is from a market where the MMOs are looking to deploy A2A interoperability in a retail payments market concentrated on a small number of banks, and the second example is from a market where the MMOs are looking to build interoperability in a more mature and competitive retail payments and banking market.

The impact assessment framework below uses a simple traffic light system to score the relative impact of the assessment criteria for each option. For example, if a cell in the assessment table is coloured:

RED – NEGATIVE IMPACT (WORSE)	AMBER – SOME NEGATIVE IMPACT (OK)	GREEN – LIMITED OR POSITIVE IMPACT (BEST)

A.2.1

Market Example 1: Concentrated Banking Sector

In most markets there are a relatively small number of mobile money schemes in operation. In many markets, the retail banking industry is concentrated in a small number of banks and electronic payments are not widespread. This example demonstrates the use of the assessment framework to consider the most appropriate implementation option for this type of market.

MARKET CONTEXT: ASSESSMENT EXAMPLE 1		
MOBILE MONEY SECTOR	**BANK PAYMENTS SECTOR**	**REGULATION**
• A small number of existing mobile money schemes; • Single operator schemes, usually MNOs; • Relatively successful schemes, with broadly similar market shares;	• Bank account market share concentrated in single bank, the national bank; • Relatively immature retail electronic payments; • Commercial payments networks are available for retail services, such as for ATMs and POS, penetration of these services is relatively low; • National ACH exists, operating intra-day clearing and settlement;	• Regulatory requirements for interoperability exist but do not specify a required organisational model; • Settlement institution is not prescribed; • Financial inclusion is a defined goal of regulations.

Analysing these market conditions using the criteria given in the sections above leads to the following assessment:

ASSESSMENT CRITERIA	BILATERAL AGREEMENT	NEUTRAL PROCESSOR	COMMERCIAL PROCESSOR	PARTNER BANK TO NATIONAL ACH	DIRECT CONNECT TO NATIONAL ACH	COMMERCIAL PROCESSOR FOR BANK INTERFACE
RISK IMPACT	MNOS UNDERSTAND BILATERAL AGREEMENTS	NEW RULES FOR SETTLEMENT REQUIRED	NEW RULES FOR SETTLEMENT. RELIES ON THIRD PARTY.	STANDARD FOR BOTH INTER-SCHEME AND BANK INTEGRATION	ALLOWS CENTRAL BANK TO MONITOR ALL INTER-SCHEME SETTLEMENT	KNOWN FOR INTER-SCHEME. NEW FOR BANK INTEGRATION
IMPLEMEN-TATION COMPLEXITY	COMMON APIS REQUIRED	New service to be created	POTENTIAL TO USE EXISTING PROCESSOR. API REQUIRED	COMMON APIS FOR SCHEMES. SINGLE BANK INTEGRATION	CHANGES TO ACH SPECIFICATIONS	POTENTIAL TO USE EXISTING PROCESSOR. API REQUIRED
TRANSAC-TION COST IMPACT	INTER-MMO SCHEME BY AGREEMENT BANK BY AGREEMENT	UNKNOWN BENEFIT FOR VERY LOW VALUE TXNS	SIGNIFICANT ADDITIONAL TXN COSTS	INTER-SCHEME BY AGREEMENT ACH BANK SUBMISSION COSTS.	PARTNER BANK ACH SETTLEMENT	UNKNOWN ADDITIONAL COSTS
REGULATORY FRAMEWORK	NO BLOCKING REGULATION	COST IMPACT FOR FINANCIAL INCLUSION	COST IMPACT FOR FINANCIAL INCLUSION	NO BLOCKING REGULATION	NOT EXPLICITLY REQUIRED BY REGULATION	COST IMPACT FOR FINANCIAL INCLUSION
AGREEMENT FRAMEWORK	EXISTING STRUCTURES	NEW JV, UNDER SCHEMES' CONTROL	NEW SCHEME AND PROCESSOR	EXISTING STRUCTURE. ACH OUTSIDE SCHEMES' CONTROL	UNDEFINED –ACH OUTSIDE SCHEMES' CONTROL	LIMITED CHOICE FOR BANK INTER-FACE OUTSIDE SCHEMES' CONTROL
SCALABILITY	DIRECT CONNECTIONS TO EACH PARTICIPANT	SINGLE CONNECTION	SINGLE CONNECTION	SINGLE CONNECTION FOR BANKS	SINGLE CONNECTION FOR ALL	SINGLE CONNECTION FOR BANKS
USER EXPERIENCE	REAL-TIME	REAL-TIME TO BE BUILT	REAL-TIME TO BE BUILT	CLEARING DELAY IN ACH FOR BANK TRANSFERS	CLEARING DELAY IN ACH FOR ALL INTER-SCHEME TRANSFERS	UNKNOWN SETTLEMENT DELAYS.
TIME TO MARKET	LIKELY TO BE RELATIVELY FAST FOR MAJOR BANKS	JV CREATION LIKELY TO BE TIME CONSUMING	REASONABLE – ASSUMING SUITABLE PROCESSOR.	LIKELY TO BE RELATIVELY FAST.	AGREEMENT REQUIRED WITH CENTRAL BANK AND BANKING SECTOR	LIKELY TO BE RELATIVELY FAST.

Table 8: Market Example 1 Assessment

An overall summary can be drawn from the above, as follows:

	BILATERAL AGREEMENT	NEUTRAL PROCESSOR	COMMERCIAL PROCESSOR	PARTNER BANK TO NATIONAL ACH	DIRECT CONNECT TO NATIONAL ACH	COMMERCIAL PROCESSOR FOR BANK INTERFACE
OVERALL ASSESSMENT	WELL UNDERSTOOD	SUSPECT TIME TO MARKET VS BENEFIT	ADDITIONAL COSTS MAY BE PROHIBITIVE	QUESTIONS OVER COST AND USABILITY	CENTRAL BANK SETTLEMENT. POTENTIAL STRATEGIC OPTION	QUESTIONS OVER COSTS AND CONTROL

Table 9: Market Example 1 Assessment Summary

In this example assessment, bilateral agreements between different MMOs and individual banks could be considered to be most appropriate. This is because the number of participant organisations is low, each having a relatively successful mobile money service, the bank market is particularly concentrated in a relatively small number of banks and added cost for interoperable transaction can be most effectively managed, since financial inclusion is a defined goal of regulations. This approach can be quick to deploy if agreement is readily reached for the technical integrations required (a solution would not necessarily require additional technical vendors) as there is no need to introduce a new legal entity which would increase commercial complexity or attempt to negotiate low-cost commercial agreements with third party processors.

A.2.2

Market Example 2: Mature Inter-Bank Connectivity

Unlike the market example above, in this example the banking sector is mature and electronic payments are more widely available and accepted. There are a relatively small number of mobile money schemes, each run by a single operator (e.g. an MNO), that have yet to gain significant penetration in the market.

MARKET CONTEXT: ASSESSMENT EXAMPLE 2		
MOBILE MONEY SECTOR	**BANK PAYMENTS SECTOR**	**REGULATION**
• A small number of existing mobile money schemes, which do not yet have significant penetration; • Single operator schemes, usually MNOs; • Relatively successful schemes, with broadly similar market shares;	• Competitive banking sector, with a number larger banks have relatively level market shares and a larger number of smaller banks; • Relatively mature retail electronic payments; • Penetration of commercial payments networks for retail services, (such as for ATMs) includes all banks; • National ACH exists, operating intra-day clearing and settlement;	• Regulatory requirements for interoperability exist but do not specify a required organisational model; • The settlement institution is not prescribed; • No explicit requirements for financial inclusion, although there is significant political will to address this.

Analysing these market conditions using the criteria given in the sections above, leads to the following assessment:

ASSESSMENT CRITERIA	BILATERAL AGREEMENT	NEUTRAL PROCESSOR	COMMERCIAL PROCESSOR	PARTNER BANK TO NATIONAL ACH	DIRECT CONNECT TO NATIONAL ACH	COMMERCIAL PROCESSOR FOR BANK INTERFACE
RISK IMPACT	MMO BILATERALS UNDERSTOOD LARGE NUMBERS OF BANK INTERFACES	NEW RULES FOR SETTLEMENT REQUIRED	NEW RULES FOR SETTLEMENT. RELIES ON THIRD PARTY.	STANDARD FOR BOTH INTER-SCHEME AND BANK INTEGRATION	ALLOWS CENTRAL BANK TO MONITOR ALL INTER-SCHEME SETTLEMENT	MMO BILATERAL UNDERSTOOD. MATURE PROCESSOR FOR BANKS
IMPLEMEN-TATION COMPLEXITY	COMMON APIS REQUIRED	NEW SERVICE TO BE CREATED	POTENTIAL TO USE EXISTING PROCESSOR. API REQUIRED	COMMON APIS FOR SCHEMES. SINGLE BANK INTEGRATION	CHANGES TO ACH SPECIFICATIONS	POTENTIAL TO USE EXISTING PROCESSOR. API REQUIRED
TRANSAC-TION COST IMPACT	INTER-MMO SCHEME BY AGREEMENT BANK BY AGREEMENT	UNKNOWN BENEFIT FOR VERY LOW VALUE TXNS	SIGNIFICANT ADDITIONAL TXN COSTS	INTER-SCHEME BY AGREEMENT ACH BANK SUBMISSION COSTS	PARTNER BANK ACH SETTLEMENT	MATURE MARKET SHOULD BE REFLECTED IN TXN COSTS
REGULATORY FRAMEWORK	NO BLOCKING REGULATION	NO BLOCKING REGULATION	NO BLOCKING REGULATION	NO BLOCKING REGULATION	NOT EXPLICITLY REQUIRED BY REGULATION	NO BLOCKING REGULATION
AGREEMENT FRAMEWORK	EXISTING STRUCTURES FOR MNOS AGREEMENTS REQUIRED WITH LOTS OF BANKS	NEW JV, UNDER SCHEMES' CONTROL	NEW SCHEME AND PROCESSOR AGREEMENT	EXISTING STRUCTURE. ACH OUTSIDE SCHEMES' CONTROL	UNDEFINED –ACH OUTSIDE SCHEMES' CONTROL	SINGLE AGREEMENT NEGOTIATED WITH ESTABLISHED PROCESSOR, MAY LIMIT SCHEMES' CONTROl
SCALABILITY	DIRECT CONNECTIONS TO EACH PARTICIPANT	SINGLE CONNECTION	SINGLE CONNECTION	SINGLE CONNECTION FOR BANKS	SINGLE CONNECTION FOR ALL	SINGLE CONNECTION FOR BANKS
USER EXPERIENCE	REAL-TIME	REAL-TIME TO BE BUILT	REAL-TIME TO BE BUILT	CLEARING DELAY IN ACH FOR BANK TRANSFERS	CLEARING DELAY IN ACH FOR ALL INTER-SCHEME TRANSFERS	COMMERCIAL REAL-TIME NETWORK AVAILABLE (I.E. ATM PROCESSOR).
TIME TO MARKET	SLOW TO MARKET FOR ALL BANKS	JV CREATION LIKELY TO BE TIME CONSUMING	REASONABLE – ASSUMING SUITABLE PROCESSOR.	LIKELY TO BE RELATIVELY FAST.	AGREEMENT REQUIRED WITH CENTRAL BANK AND BANKING SECTOR	LIKELY TO BE RELATIVELY FAST.

Table 10: Market Example 2 Assessment

An overall summary can be drawn from the above, as follows:

	BILATERAL AGREEMENT	NEUTRAL PROCESSOR	COMMERCIAL PROCESSOR	PARTNER BANK TO NATIONAL ACH	DIRECT CONNECT TO NATIONAL ACH	COMMERCIAL PROCESSOR FOR BANK INTERFACE
OVERALL ASSESSMENT	DIFFICULT TO MANAGE SCALE TO BANKING SECTOR	SUSPECT TIME TO MARKET VS BENEFIT	ADDITIONAL COSTS MAY BE PROHIBITIVE	QUESTIONS OVER DELAY IN ACH	NO EXPLICIT REQUIREMENT FOR CENTRAL BANK SETTLEMENT. POTENTIAL STRATEGIC OPTION	BILATERAL FOR MMO SCHEMES, MATURE OPERATION, REAL-TIME PROCESSOR FOR BANKS, SHOULD BE ABLE TO MANAGE COST

Table 11: Market Example 2 Assessment Summary

In this example assessment, bilateral agreements between different MMOs, and using a commercial process to connect to all banks, could be considered to be most appropriate. This is based on the assumption that an established in-country processor operates an existing mature real-time service for the banking sector, which has costs appropriate to the needs of the local market; and that the national ACH cannot offer a similar level of service. This mixed approach should be relatively quick to deploy if agreement between schemes is readily reached for the technical integrations required and between schemes and the commercial bank processor.

Appendix B – ACH and RTGS Basics

B.1

OVERVIEW

This appendix discusses the potential use of banking a sector central settlement system (e.g. an ACH) for the processing and settlement of transactions between MMO schemes – providing A2A interoperability between schemes. Automated clearing house (ACH) is the American term for a Central Bank service that provides bank account to bank account payment transaction clearing and settlement. Typically, an ACH is used for lower-value payment transactions for the retail bank market, although not necessarily as low as commonly occurs in MMO schemes.

The appendix discusses the typical arrangements for lower-value direct credit transactions (i.e. a sender initiated transfer from one bank account to another) using an ACH, with the objective to provide background information for its potential use for the processing and settlement of A2A transactions.

It is worth noting that in some markets an ACH may not be used and that lower-value direct credits between banks may be carried out using direct connectivity under bilateral agreements between banks. This highlights that the need for a payment network for lower-value payments is very dependent on local market conditions.

The source of material relating to general central bank activities is the Bank of International Settlements report 'The role of central bank money in payment systems'[17] and 'Principles for Financial Market Infrastructures'[18].

17. BIS, Committee of Payments and Settlement Systems, The role of central bank money in payment systems, http://www.bis.org/publ/cpss55.pdf
18. BIS, Committee of Payments and Settlement Systems, Principles for Financial Market Infrastructures

B.2

INTER-BANK PAYMENT SYSTEMS

A payment system can be thought of as "a particular set of payment instruments, technical standards for the transmission of payment messages and an agreed means of settling claims among system members, including use of a nominated settlement institution."18

An inter-bank payment system is a "means of settling claims" between commercial banks issuing money and using the central bank as the settlement institution. The payment may either be financed with funds already on the account of the paying bank or with credit provided by the settlement institution.

An inter-bank payment system involves the customers of the commercial banks making and receiving payments. Additionally, the system can encompass customers of other banks, where the bank has a correspondent relationship with a commercial bank payment system member, to create more complex chains of payments than seen in a straightforward single bank-to-bank transfer.

A typical inter-bank payment system is illustrated below.

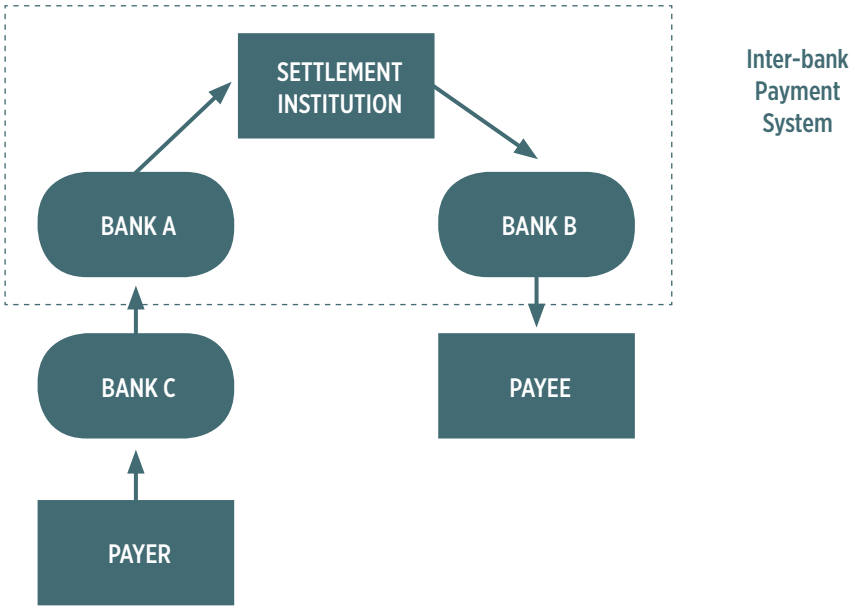

Figure 8: Typical Inter-bank Payment System

Each organisation has the following roles:

Central Bank (Settlement Institution):

- Provides accounts for members of the inter-bank payment system
- Provides liquidity (ie issues money and lends member banks funds)
- Manages risk throughout system (ie sets the rules for provision of liquidity by members)

Member Banks (Bank A and Bank B):

- Are commercial banks and members of the inter-bank system
- Have settlement (reserve) accounts with the settlement institution
- Provide accounts and payment services for their customers
- Manages the counterparty risk associated with its Agency Banks
- Provide liquidity to its customers (ie issue and lend money)

Agency Banks (Bank C):

- Represent second-tier banks who do not have direct connection to payment system
- Have a correspondent relationship with a Member Bank
- Manages the counterparty risk associated with its Member Banks
- Provide accounts and payment services for its customers

Payer:

- Sender organisation or individual
- Originator of the payment instruction

Payee:

- Beneficiary for the payment.

Typically, the following types of payment products are offered through inter-bank payment systems:

- Direct Credit – on instruction from the Payer, a single funds transfer from a payer's bank account into the Payee's bank account
- Direct Debit – on instruction from the Payee (the Originator), a single or recurring funds transfer from a payer's bank account into the Payee's bank account
- Standing Order – on instruction from the Payer, a recurring funds transfer from a payer's bank account into the Payee's bank account

In any market there are likely to be number of inter-bank payment systems that has the Central Bank as the settlement institution (i.e. the lender of last resort). Typically, an ACH is used for lower-value payment transactions for the retail bank market. And, again typically, higher-value payments between banks are undertaken using a real-time gross settlement (RTGS) service.

B.3

ACH PAYMENT SYSTEMS

As introduced above, the transaction processing for lower-value payments through the ACH is separate to the higher-value processing through the RTGS, which provides the funds settlement between the member banks of the ACH.

This is illustrated below:

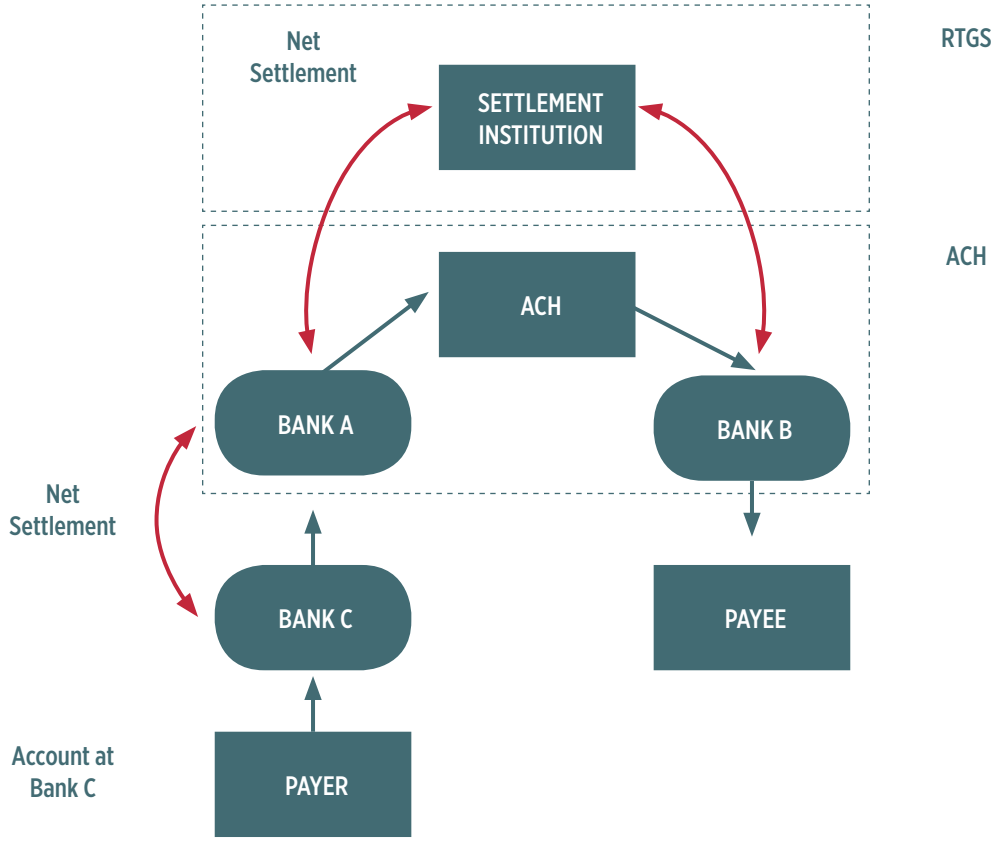

Figure 9: Typical ACH Payment System

The typical process for direct credits is (ignoring the agency bank in the diagram above):

- The Payer send an instruction to their Bank to transfer money from their account to the account of the Payee;
- The Payer's bank debits the Payer's account and sends the instruction to the ACH;
- The ACH determines that the Payer's Bank owes the Payee's Bank the appropriate amount, netting all transactions, and notifies the Payer's Bank;
- The Payer's Bank pays the Central Bank;
- The Central Bank pays the Payee's Bank;
- The Payee's Bank credits the Payee's bank account.

The typical transaction functionality of an ACH processor is straightforward. It receives transactions instructions, verifies and routes them to the correct bank and notifies the originator of the outcome. This is illustrated below:

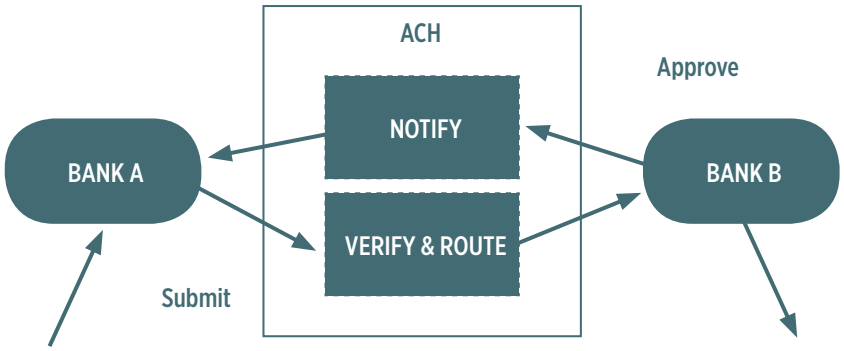

Figure 10: ACH Transaction Functions

The time interval for settlement of the transactions processed through the ACH depends on the capabilities of the RTGS – where the actual funds associated with the transaction instructions are settled between the banks. If the RTGS is not capable of intra-day settlement, then ACH settlement cannot be intra-day. The frequency for ACH transaction settlement depends on the period supported by the settlement institution's RTGS.

Payments between the Central Bank and the Member Banks are via settlement or reserve accounts at the Central Bank, and, typically, count as part of their overall liquidity ratios.

In some schemes, the ACH is allocated a settlement account at the Central Bank and sends instructions to pay against that account. Therefore, in this case, the Payer's Bank pays (the net settlement amount) into the ACH settlement account from its account at the Central Bank and the ACH pays into the Payee's Bank account at the central bank.

In some markets (notably the UK), there are multiple ACH systems. Legacy ACH systems, operated using a batched next day transaction settlement approach, continue to be used for direct debit instructions for utility and regular bill payments, which have a very much higher volume than is required for direct credits. Here, direct credits operate on a separate system to an intra-day settlement cycle. Both transactional systems use the central bank as the settlement institution. (Note: the environment in the US is more complicated as they have multiple Federal Reserve Banks under the Federal Reserve.)

The separation of RTGS and ACH means that each system can be operated by different organisations. As the ACH is a transaction netting operation it is a technical operation and is often run on an outsourced arrangement from the payment system 'owner' (ie the members).

B.4

DIRECT CONNECTION TO AN ACH

For organisations having large volumes of transactions, for efficiency purposes, some ACH systems allow direct connections. This allows corporate customers and service providers (bureaux) to be able to submit transactions directly into the ACH processor without passing the transaction instruction through a member bank. Funds are settled through bank accounts as normal. This is illustrated below.

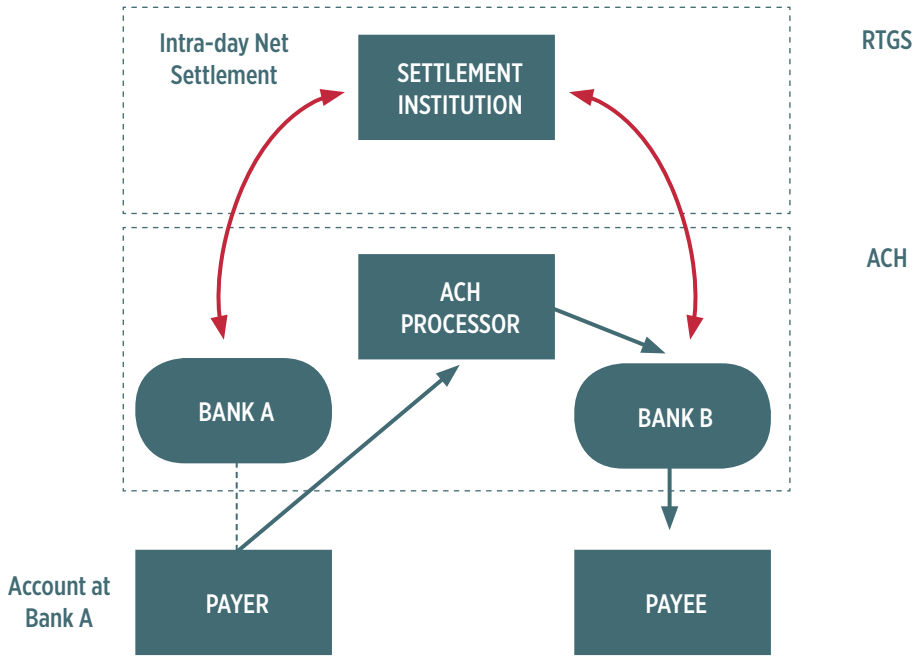

Figure 11: Direct Connection to an ACH

Some Central Banks require very high volume transaction originators to have a direct connection into the ACH. The criteria to this can depend on the number or value of transactions is relation to the number or value of transaction submitted in total by their bank. This allows integrity risk and reliability to be managed more directly.

B.5

CLEARING MMO E-MONEY THROUGH AN ACH

One of the potential implementation options for A2A interoperability (see section 3.6), speculates that one potential option would be for MMO schemes to connect directly to the inter-bank ACH to enable e-money account to bank account transactions to be submitted. This aims to enable all transactions, including inter-scheme e-money transactions, to be passed through the ACH.

Note: The ACH scheme would need to change to allow references for mobile wallet accounts as well as bank accounts; or the MMO scheme change to use ACH bank account references.

The research conducted for this paper did not find any examples of an inter-bank ACH being used for e-money to bank account transfers. Although, in principle, e-money has a par value with real money and the use of specific reserve or limit accounts for settlement of e-money could be a valid approach, there does not seem to be specific examples to draw on for comparison.

Appendix C - Example Task Force Terms of Reference

This appendix provides an example of the Terms of Reference for a collaborative industry body to drive A2A interoperability in a market. This body is referred to as the Task Force (see Section 6 above).

PURPOSE – A high-level statement of the aims of the Task Force:

The Task Force is an industry forum to allow MMOs to discuss, investigate and, if appropriate, agree and define a common approach for A2A interoperability between accounts at different MMO payment schemes and between accounts at MMO schemes and at banks.

REPORTING – Formal and informal reporting structure for the Task Force:

Representatives participating in the Task Force report progress to their respective management within their organisations.

The Task Force may also provide information on its activities and deliverables to the Central Bank.

OBJECTIVES – Outline of the objectives of the Task Force:

The objectives of the Task Force are:

- Provide a forum for discussion and investigation relating to the development and deployment of interoperable MMO payment schemes;
- Facilitate cooperative activity relating to the development of interoperable mobile e-money, including:
    a. Interoperable specifications;
    b. Service delivery processes;
    c. User experience;
- Enable resolution of all non-competitive issues that may lead to an increase in risk;
- Identify and engage with external stakeholders (such as banks) in the development of interoperable MMO payments;
- Promote interoperability of technology and service delivery across MMO scheme implementations;
- Identify and share non-confidential information between participants on any aspects of specifications and implementations.

SCOPE – A description of the scope of work for the Task Force:

The initial scope of work for the Task Force is limited to interoperability of MMO payment schemes between themselves and with bank accounts. Other types of interoperability are currently outside the scope of the Task Force. Additional aspects may be considered if agreed by all participants and as such the scope of work for the Task Force may change over time.

MEMBERSHIP – An outline of the non-exclusive member criteria for the group, including:

The Task Force is open to staff from MMO payment schemes.

Representation on the Task Force should be consistent throughout the operation of the group and with decision-making authority for their respective organisation.

With prior warning, members of the Task Force may choose to invite colleagues, banking sector representatives or external experts to attend meetings as particular subject experts.

METHOD OF WORKING – Description of how members of the Task Force would work together, such as:

Face to face meetings are to be held on a quarterly basis, with monthly conference calls being held between meetings.

The Task Force will be administered by:

- Chairman – XXX (to be decided);
- Secretary – XXX (to be decided).

The agendas for meetings are set by the Task Force – with representatives submitting items for the agenda at least five working days in advance. The agenda will be made available at least four working days before each meeting.

The Task Force will commission specific work items (with agreed deliverables and timescales) for particular workstreams through assigned workstream participants.

A workstream deliverable will be reviewed by the Task Force and relevant MMO representatives before the deliverable is published to a wider audience.

FUNDING – Description of how the Task Force is to be funded. For example:

The Task Force does not have a specific allocated budget.

Resources for administration, meetings and deliverables will be provided by participating MMOs.

Any funding requirements will be considered as they are identified and cost allocation agreed by the members of the Task Force.

CONFIDENTIALITY – The inclusion of confidential clauses, such as:

Each participant undertakes that it will not at any time during its participation use, divulge or communicate to any outside bodies or individuals or other parts of a participant's group not being a participant of the Task Force (except as may be required by law or any legal or regulatory authority), any confidential information concerning the business or affairs of the Task Force.

Confidential Information may include, but is not limited to, know-how, trade secrets and information of a commercial or sensitive nature, discussions, resolutions, minutes, papers, documents and information of any kind.

CONSTRAINTS – Limitations to ensure that the Task Force does not act in a non-competitive way. Clauses such as:

The Task Force will not be permitted to discuss any matters that are:

- Contrary to the provisions of in country competition regulations;
- Commercially sensitive to participating organisations;
- The marketing of products or services from external organisations, except in cases where there is a defined potential benefit.

Appendix D - Glossary of Terms

The table below defines the terms and abbreviations used within this document.

ABBREVIATION OR TERM	DEFINITION
A2A	ACCOUNT-TO-ACCOUNT
ACH	AUTOMATED CLEARING HOUSE
ATM	AUTOMATED TELLER MACHINE
INTEROPERABILITY	THE ABILITY OF SYSTEMS TO SHARE DATA AND OPERATE RECIPROCALLY
MMO	MOBILE MONEY OPERATOR
MNO	MOBILE NETWORK OPERATOR
RTGS	REAL-TIME GROSS SETTLEMENT

Table 12: Terms and abbreviations

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