

White Paper

**Business models
for NFC payments**

Business Workgroup

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Chairman's Foreword

When I started working on this paper I realised straight away that it would be a challenge. Technically, it was more or less clear what we could do with near field communication (NFC) technology to enable mobile payments. From a business standpoint, however, it was not easy to understand how we could establish relationships between stakeholders to effectively enable widespread adoption.

NFC changes the rules of proximity payments because in most cases a new ecosystem is needed. These ecosystems do not operate in isolation and are designed according to which business model is adopted and technology selected. Many factors influence the decision-making process including the preferences of different geographic markets.

Therefore, it has been a pleasure to work on the development of this white paper as part of the international community brought together by Mobey Forum. The collective expertise from different countries has encouraged the exchange of perspectives and knowledge which has enriched the content considerably. The Mobey Forum platform has also facilitated engagement and input from the Mobile Channel Working Group (MCWG) of the European Payments Council (EPC), which assisted us in agreeing the starting point for this paper.

The end result of our work is an analysis of the various NFC business models available. The paper highlights the key factors to be considered when selecting technology, the possible implementation approaches, and which of them has the most potential. Some of the business models have been discussed in depth to serve as examples.

This white paper, therefore, does not deliver a single solution but provides readers with the information to decide what best suits their requirements. To assist readers, the paper also includes a gap analysis, draws some conclusions and makes certain recommendations.

Our aim is to assist in clarifying the possible scenarios and ultimately speed up the development and use of NFC technology for payments.

Finally, I would like to thank all members of the Mobey Forum Business Workgroup for their efforts, contributions and time invested to produce such an important document. Without their input, this study would not have been possible.

Jordi Guaus

"la Caixa" & Mobey Forum Business Workgroup Chair

Executive Summary

The aim of this document is to analyse potential business models for facilitating mobile contactless payments when an NFC device is used, taking into account all the stakeholders involved. The analysis focuses on point of sale (POS) transactions using cards as a payment instrument.

NFC payments ecosystems need to be evolved from existing technology and networks to ensure they are market friendly and sustainable. There are many approaches which can be adopted depending on which factors are taken into consideration and the importance placed on each. One of the key factors is where the mobile contactless payment application (MCPA), which resides in the secure element (SE), should be stored in the mobile handset. The owner – or issuer – of the SE has a major stake in the control of the ecosystem. This is one of the key areas of analysis in this paper.

To aid the business analysis, the paper does not consider every possible way of implementing NFC but just a few of the strongest contenders. Based on some realistic scenarios, it also details four ways of implementing NFC based on potential business models:

- The mobile network operator (MNO) issues the universal integrated circuit card (UICC) as part of a collaborative model.
- The MNO issues the UICC as part of a bilateral model.
- The handset manufacturer issues the embedded chip as part of a bilateral model.
- The MCPA service provider (SP) issues the microSD as part of a standalone model.

For each implementation, the paper provides a business rationale analysis, an expenditure analysis and some market and technical considerations. The analysis shows that it is possible to produce a business model for each case.

Stakeholders will recognise which of these NFC implementation models best fit their needs and appreciate that an exact match is unrealistic. Additionally, some players may want to use a combination of these ideas to suit their business model.

To help put theory into practice a gap analysis together with some conclusions and recommendations is provided.

The gap analysis highlights:

Technical issues:

- Common guidelines: Global guidelines will help mobile contactless payments service providers to develop their offerings within a sustainable and scalable environment.
- Acceptance infrastructure: A precondition for mobile contactless payments is to have the acceptance infrastructure in place and ready to accept contactless transactions.
- Availability of NFC handsets and SEs: There is limited market availability of NFC handsets and not all support SEs. A wide range of full NFC devices supporting card emulation is needed.
- Contactless terminals (contactless POS): The advancement of a more powerful range of NFC contactless terminals.
- MCPA (applet): The availability of MCPA is low.
- User interface: Further effort needs to be put into making user interfaces more intuitive as this will play a key role in the user experience.
- Infrastructures and systems: Connectivity between stakeholders should be ready.
- Certification: The end-to-end chain should be certified including the over-the-air (OTA) process. A certification process should be defined.

Business issues:

- To have a clear idea of how to go to the market. This means defining which models best fit the MCPA SP.
- To define a clear business case considering:
- Not just revenues and expenditures but also rules of the market, such as contactless interchange fees and commissions for low value.
- The issuing process and life cycle management costs.
- Other benefits such as customer retention.

The conclusions are summarised below:

- NFC contactless payments will become a reality due to consumer demand.
- The technology is ready but device and terminal availability and other related issues lag behind.
- There are many implementation models to choose from. Every MCPA SP should evaluate which model best matches their strategy and market.
- For each model it is possible to define a business case.
- Interoperability is a key factor.

Finally, the paper makes the following recommendations:

- All actors within this space should be prepared even if they do not plan to roll out the service straight away.
- Adding other services such as couponing, loyalty cards and so on – which are innovative and offer users increased convenience and ease of use – will help to create demand.
- Investment needs to be made in the merchant infrastructure.
- In terms of card products for the new form factor, ensure customers can choose the same type as their plastic card format.
- Focus on a single issuing strategy at the beginning.
- Formulate a trusted service manager (TSM) strategy.

1 Introduction

1.1 Mobey Forum

Driven by its membership, Mobey Forum produces comprehensive documentation on the recommended architecture for a wide range of mobile financial services, which is further supported by trials and demonstrations. The association also supports members' deployments and actively contributes to new pilots and implementations within the marketplace. Through its information, analysis sharing and cross-industry collaborations, Mobey Forum is known as the key source of independent insight within the mobile financial services sector.

This document has been developed by the Mobey Forum Business Workgroup, which aims to create a common understanding of business opportunities, trends and challenges within the mobile financial services landscape. The paper is intended to provide industry guidance and market consultation.

1.2 Focus of this report

Mobile payments and mobile financial services provide new opportunities to reach customers. The mobile channel can act as a virtual branch, offering mobile financial services to end-users or it can become a new form factor for mobile payments.

Taking mobile payments as services independent of mobile banking (that is, excluding money transfer through mobile banking), two basic types of mobile payments can be identified: remote and proximity.

Mobile remote payments are those initiated using a mobile device regardless of the location of the payer or the payee. For example, person-to-person mobile money transfers, where transactions are sent over the mobile operator or WiFi network rather than a retail POS, are outside the scope of this document.

Mobile proximity payments – or contactless payments – are transactions that require the mobile device to be in close proximity to a ‘reader’. For example, when a purchaser waves, taps or touches their mobile phone on a POS terminal to make a transaction and pay for goods quickly and efficiently. These types of contactless transactions use short-range wireless coverage and do not depend on the cellular network of an MNO. In the case of mobile phones, the technology standard for this proximity coverage is NFC.

This paper focuses on mobile proximity payments using mobile phones with NFC capabilities that have been embedded in the device or integrated through additional hardware.

2 Document information

2.1 List of references

#	Title	Reference
1	Alternatives for banks to offer Secure Mobile Payments	Mobey Forum, June 2010 http://www.mobeyforum.org/Press-Documents/White-papers
2	The Trusted Execution Environment: Delivering Enhanced Security at a Lower Cost to the Mobile Market	GlobalPlatform, February 2011 http://www.globalplatform.org/documents/GlobalPlatform_TEE_White_Paper_Feb2011.pdf
3	Mobile Contactless Payments Service Management Roles – Requirements and Specifications	European Payments Council (EPC) – GSMA, October 2010 http://www.europeanpaymentscouncil.eu/knowledge_bank_detail.cfm?documents_id=423
4	Best Practice for Mobile Financial Services – Enrolment Business Model Analysis	Mobey Forum, June 2008 http://www.mobeyforum.org/Press-Documents/White-papers
5	Draft Mobile Contactless SEPA Card Payments Interoperability Implementation Guidelines	EPC, April 2011 http://www.europeanpaymentscouncil.eu/news_detail.cfm?news_id=195

2.2 Glossary

Term	Definition
3G, 4G	The third (3G) and fourth generations (4G) of mobile technology, characterised by increasing data throughput speeds.
Acquirer	A payment service provider enabling the processing of merchants' transactions' with the issuer through an authorisation and clearing network. In our context it effectively means accepting mobile payments.
Cardholder	A consumer who has an agreement with an issuer for the MCPA service. They need to be an MNO subscriber with an NFC-enabled mobile device.
Cardholder Verification Method (CVM)	The method of verifying that the purchaser has a right to use the payment instrument (card).
Consumer	In the context of this document, the consumer is a cardholder.
Customer	A customer can be either a consumer or a merchant.
Handset Manufacturer (HM)	The manufacturer of a mobile handset.
Embedded Secure	Is a non-removable secure chip fixed in the motherboard of the handset.
Element (eSE)	
Merchant	The accepting agent in a mobile contactless payment scheme where the consumer (cardholder) purchases goods or services. Also known as the attendant in the case of an attended POS. The merchant is a customer of its acquirer.
MicroSD card	Secure Digital (SD) is a non-volatile memory card format developed by the SD Card Association for use in portable devices. MicroSD is a smaller size secure digital memory card. MicroSD can also be expressed using the Greek prefix as μ SD.
Mobile Contactless Payment (MCP)	A payment initiated by a mobile phone (or other device) where the cardholder and the merchant (and/or their equipment) are in the same location and communicate directly with each other using NFC for data transfer (also known as contactless payments). In the context of this document all mobile contactless payments are mobile contactless card payments.
Mobile Contactless Payment Application (MCPA)	An application residing on an SE performing the payment functions, as dictated by the issuer, using NFC.
Mobile Contactless Payment Application Service Provider (MCPA SP)	A payment service provider delivering the MCPA to the consumer (cardholder). Also referred to as the card issuer.
Mobile Network Operator (MNO)	A mobile phone carrier offering a range of mobile services that can potentially facilitate NFC services such as MCPs. The MNO ensures connectivity OTA between the customer and the MCPA SP.
Near Field Communication (NFC)	A contactless protocol specified by ISO/IEC 18092.

Term	Definition
Over the Air (OTA) Provisioning	The ability to download and manage content over a wireless network.
Payment Scheme (Card Scheme)	A technical and commercial arrangement set up to serve one or more card brands and which provides the organisational, legal and operational framework rules necessary for the services marketed by the brand to function.
Payment Transaction	The act, initiated by the cardholder or by the merchant, of placing, transferring or withdrawing funds, irrespective of any underlying obligations between the card holder and the merchant.
Handset Platform Provider	The provider of the handset operating system (OS).
Point of Sale (POS)	A POS terminal holds the software used at the checkout. It manages the selling process with a salesperson-accessible interface. It also creates and prints receipts.
Secure Element (SE)	A tamper-resistant platform (device or component) capable of securely hosting applications and their confidential and cryptographic data (e.g. key management) in accordance with the rules and security requirements detailed by trusted authorities. Examples include UICC, embedded SE (eSE), chip cards and SD cards.
SE Issuer	A stakeholder responsible for issuing and maintaining an SE.
Subscriber Identity Module (SIM)	A SIM is a removable smart card for mobile phones. It securely stores the service-subscriber key used to identify a mobile phone. The use of a SIM is mandatory in the GSM environment. The equivalent of a SIM in a Universal Mobile Telecommunications System (UMTS) is the UICC.
Trusted Service Manager (TSM)	An independent trusted party acting on behalf of the SE issuer and/or the MCPA SP which facilitates the provisioning and secure life cycle management of mobile contactless services.
Universal Integrated Circuit Card (UICC)	The UICC is a generic standardised SE owned and provided by the MNOs that stores the service-subscriber key used to identify a mobile phone. See the definition for SIM.
User Interface (UI)	The mobile handset application that executes user interactions related to the MCPA, as permitted by the MCPA SP.

3 Creating the NFC Payments Ecosystem

3.1 Delays in adoption

Over the past few years there have been many trials and pilots to showcase the abilities of near field communication (NFC) technology. Although these have been well received – demonstrating that customers enjoy making payments with their mobile devices and that merchants with POS terminals can efficiently process transactions – only a few commercial implementations have been launched. This raises the question: why has NFC mobile payment technology not been more widely adopted?

The mobile financial services industry acknowledges that a significant investment is required from merchants to install NFC-capable acceptance terminals, and there has to be a real and sustainable business motivation to make this commitment. In addition, there has also been a lack of commercially available and ready to purchase contactless mobile devices on the market.

Although these factors are hindering the wide-scale implementation of mobile NFC payments, the industry is agreed that the technology is secure, powerful and capable, and once installed, provides multiple benefits to all stakeholders. What is of greater concern is the development and unambiguous definition of an ecosystem that can support the long-term evolution of this market while addressing the individual needs of a wide range of stakeholders. It is understandable that until stakeholders have a clear vision of the business model and the business case, there will be reluctance to invest the resources required to achieve mobile NFC payment deployment on a mass market scale.

A further consideration is the secure element (SE) in the mobile equipment where the mobile contactless payment application (MCPA) is stored. There are several types of SE, and depending on which is selected the roles of stakeholders change. The owner (or issuer) of the SE has a major stake in the control of the ecosystem. This means that relationships inside the ecosystem depend on which SE is chosen; so, ultimately, the business model adopted depends on the SE.

3.2 Objective of this document

The objective of this document is to analyse potential business models for mobile contactless (NFC) payments taking into account all of the stakeholders involved.

As the role of the stakeholders will depend on the type of SE – and there are many alternatives and combinations – this white paper offers examples of how to develop the different potential business models.

Following the definition of these scenarios, there is a business gap analysis which identifies the key criteria required for mobile contactless payments and indicates which of these currently exist.

Finally, there are some conclusions and recommendations highlighting how stakeholders can successfully develop the mobile contactless payments ecosystem.

4 Scope of this document

To define the scope of this document, it is necessary to review some key concepts.

4.1 Analysis of Secure Elements (SE)

4.1.1 SE definition

A SE is a platform (device or component) onto which applications (apps) can be downloaded, installed, personalised and managed, preferably over-the-air (OTA). It is a combination of hardware, software, interfaces and protocols that enable the secure storage and usage of credentials for payments, authentication and other services. SEs can be categorised into three groups:

- Removable SEs such as stickers, secure microSD cards and Universal Integrated Circuit Cards (UICCs).
- Non-removable SEs for example embedded SEs.
- SEs from a combination of software programs on dedicated hardware such as trusted execution environment.

The MCPA SP can choose between different SEs to build a service package. Their choice of SE will have a significant impact on their business model and on the service level they want to achieve. The following section describes the different types of SE.

4.1.2 Types of SE

Essentially, there are five SE options:

- **Stickers** are self-adhesive contactless cards or tags designed to be attached to the back of any device including mobile handsets. There are two types of sticker: passive and active. Active stickers are capable of interfacing to a mobile handset's application execution environment.
- **MicroSD** cards can be inserted into the mobile handset and are effectively embedded chips that serve as SEs and extend the security level and service offerings on mobile devices. There are two options: full NFC or SE-only. Full NFC microSD cards incorporate their own antenna while SE-only microSD cards rely on the NFC antenna in the handset.

- **UICC** is the universal integrated circuit card in 3G and 4G mobile networks. It is the physical smart card used to control a mobile device's access to the mobile network operator (MNO) infrastructure. Also known as a U-SIM (Universal Subscriber Identity Module). [Note: There is also a bridging technology that adds a flexible integrated circuit with a secure chip and an antenna to the SIM slot. By doing this, it is possible to convert mobile phones with a regular SIM into NFC-enabled mobile devices.]
- **Embedded secure elements (eSEs)** are shipped in NFC-enabled phones as well as non-NFC devices. They have a proven level of technical maturity and have been in use since 2004.
- **Trusted Execution Environment (TEE)** is a secure area that resides in the main processor of the phone and guarantees that sensitive data is stored, processed and protected in a trusted environment. Its ability to offer safe execution of authorised security software, known as trusted applications, enables the TEE to enforce protection, confidentiality, integrity and access rights of the data belonging to those trusted applications.

More information about SEs in general and in particular about alternatives of SEs is provided in reference 1. More information about TEE is provided in reference 2. In reference 1, the TEE is called a Trusted Mobile Base (TMB). As GlobalPlatform has recently completed work on the TEE, Mobey Forum has decided to use this new definition in this paper.

4.1.3 Reasoning behind the selected SE types in this white paper

The type of SE used will have an impact on the role that each stakeholder plays and the ecosystem created. To complete the analysis, the following considerations have been taken into account when selecting the SEs to include in this study:

- **Technology maturity and implementation.**
 - The TEE is not as mature as other SEs and it is not clear how or when it will be tested and deployed. GlobalPlatform, however, is continuing to work on the specification of APIs in the TEE. As such, the TEE is not considered viable at the moment and is omitted from this paper.
- **The mobile device should be mandatory for a mobile contactless payment.**
 - The mobile device is not vital when deploying stickers, even in the case of active stickers. Self-adhesive contactless cards or tags can, for example, be linked by Bluetooth, and the mobile phone could be substituted by other devices or objects. Stickers are therefore considered out of the scope of this paper.
- **Real impact on the business model.**
 - There is limited impact on business models when using full NFC microSD instead of SE-only microSD. Therefore, this paper considers microSD cards regardless of whether they are full NFC or SE-only. What is important to note, in terms of time to market, is that full NFC microSDs provide a solution to the current lack of NFC handsets.

- **Global acceptance and standardisation of an SE.**

- A flexible antenna integrated into a secure chip and added to the UICC or U-SIM is an example of a bridging technology. While this solution could work in some markets, it has not been standardised and is thus not part of the scope of this paper.

Consequently, the only types of SE covered in this paper are: UICC, embedded SE and secure microSD cards.

4.2 Ecosystem dependencies

This paper focuses on the development of an NFC payment ecosystem that supports mobile NFC payments. A full NFC ecosystem where other applications and services can be deployed is not described.

The NFC payment ecosystem is based on existing and established networks with the addition of new stakeholders. At a basic level both the payment at POS and the MNO ecosystems are used. Although a contactless payment infrastructure is needed, this functionality is currently not available in many markets.

Traditional payment ecosystem stakeholders and their relationships can be represented as:

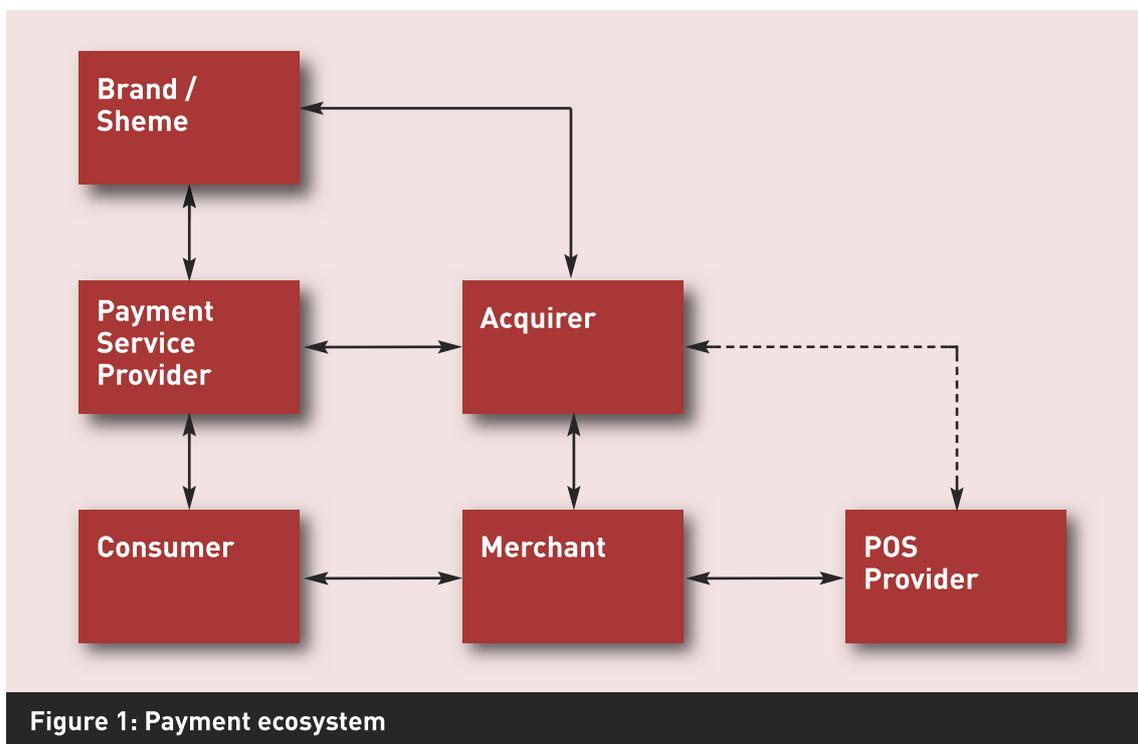


Figure 1: Payment ecosystem

The consumer uses a card (payment instrument) issued by a payment service provider to pay for goods or services at the POS. The payment is processed by the acquirer of the merchant for authorisation and confirmation. Finally, there is the clearing process between the payment service provider, the acquirer and the scheme.

For contactless payments, an NFC acceptance infrastructure has to be in place (contactless POS and contactless transactions processing). In the case of plastic cards, the payment service provider should provide customers with contactless cards.

MNO ecosystem stakeholders and their relationships can be represented as:

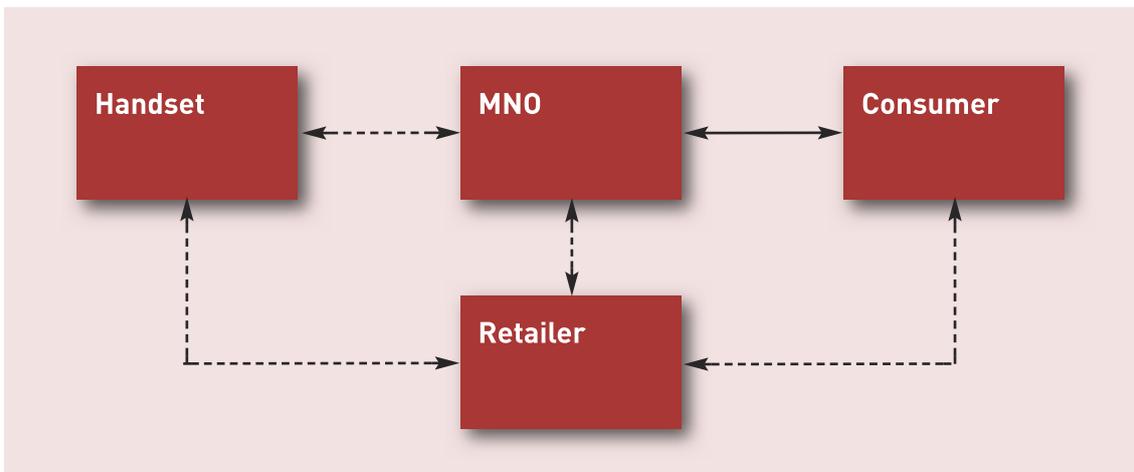


Figure 2: MNO ecosystem

The consumer has a mobile service subscription (post-paid or prepaid). Depending on the domestic market, the consumer buys the mobile phone made by the Handset Manufacturer (HM) from a retailer or directly from the MNO.

When moving to NFC payments the following stakeholders need to be added:

- An SE provider or manufacturer and a SE issuer are required to provide the SE that will be placed in the mobile phone, unless it exists already.
- The payment service provider becomes a MCPA SP.
- Optionally, a new stakeholder that acts as an enabler to link the stakeholders together in a secure and independent manner can be defined as the Trusted Service Manager (TSM).

NFC payment ecosystem stakeholders and their relationships can be represented as:

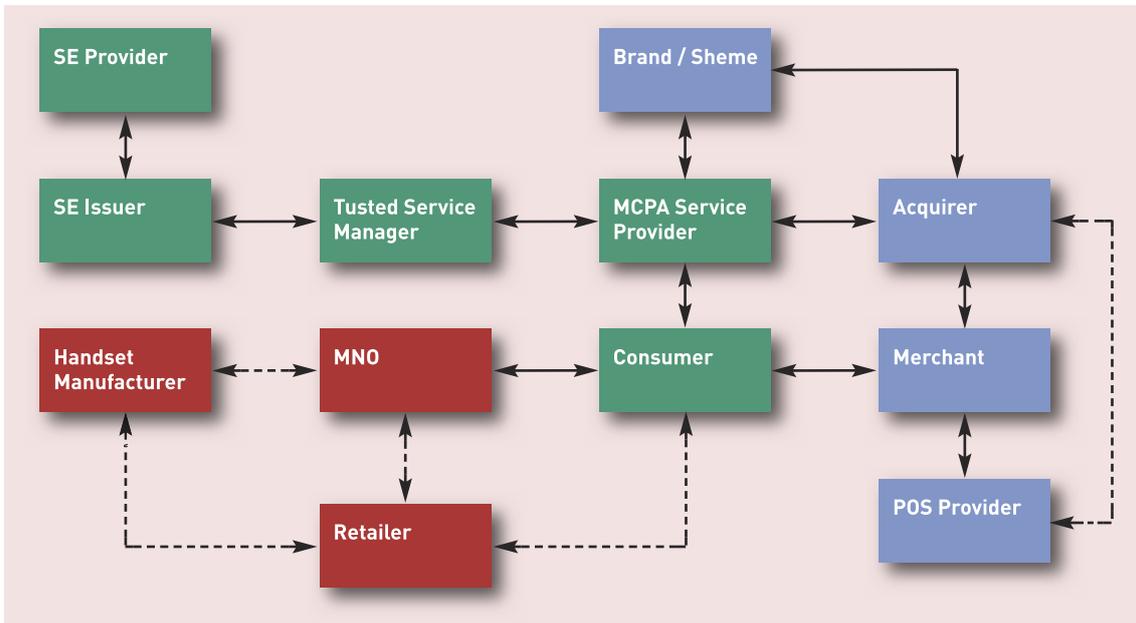


Figure 3: NFC ecosystem

The consumer will continue paying with a card, but now this card is stored inside a SE in the mobile device.

This is a generic representation of an NFC payment ecosystem. As explained later in this white paper, however, usually the SE issuer is one of the other stakeholders. For example, in the case of UICC, the SE issuer will be the MNO. So in this particular case, the NFC payment ecosystem can be simplified as follows:

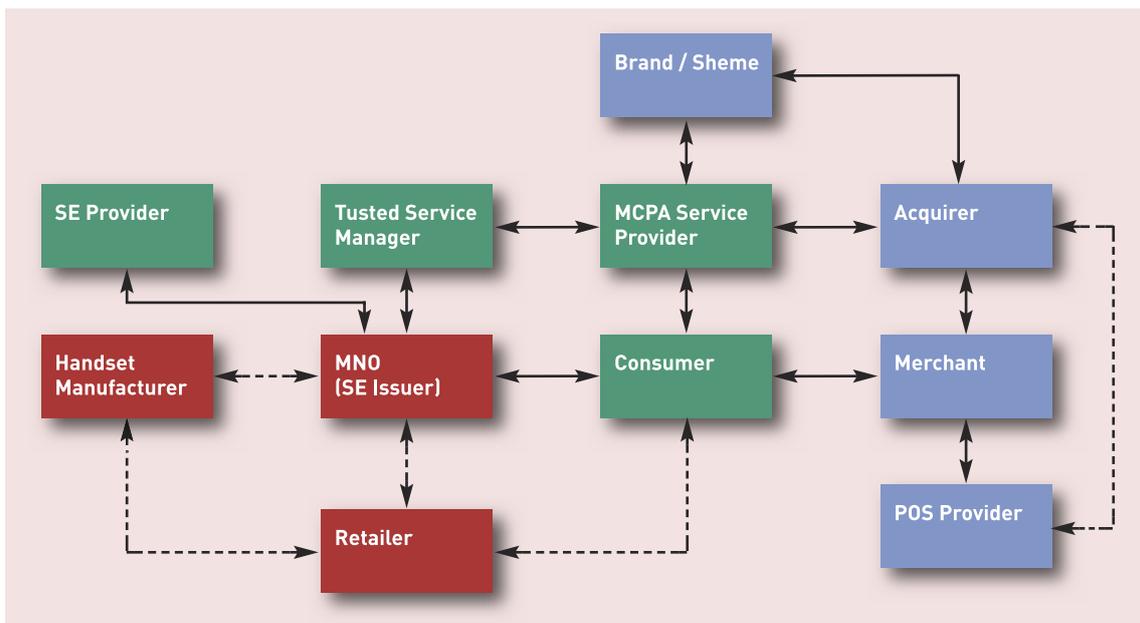


Figure 4: NFC ecosystem - UICC as SE

4.3 Stakeholders

To understand the business dynamics of the ecosystem(s) discussed in this document, this section defines the different stakeholders involved and their roles.

4.3.1 Consumer

The consumer (end user) is at the heart of any ecosystem. The consumer owns the payment credential (card) and initiates service requests and agreements.

To be a part of the NFC payment ecosystem, a consumer must establish a relationship and/or service agreement with the following ecosystem stakeholders:

- MCPA SP.
- SE issuer.
- Merchant (per payment).

Relationships in other, related ecosystems:

- MNO ecosystem with MNO for network subscription and in some markets, handset.
- NFC payment ecosystem with other MCPA SPs.
- Payment ecosystem with other payment service providers.

4.3.2 Merchant

The merchant is the consumer's counterpart in the NFC payment transaction. The merchant offers goods or services for sale and decides which payment options to offer to the consumer.

To be a part of the NFC payment ecosystem, a merchant must establish a relationship and/or service agreement with the following ecosystem stakeholders:

- Acquirer, for NFC payments acceptance.
- POS provider (in some markets the POS is provided by the acquirer).
- Consumer (for payment).

Relationships in other, related ecosystems:

- Payment ecosystems (including contactless) for contact and contactless card (plastic) payments.

4.3.3 Mobile Contactless Payment Application Service Provider (MCPA SP)

The service provider issues the payment application to the consumer. An MCPA SP must be a payment service provider. In the context of this document, it is always also the card issuer. The service provider determines the profile of the payment application and the terms of use.

To be a part of the NFC payment ecosystem, the MCPA SP must establish a relationship and/or service agreement with the following ecosystem stakeholders:

- Consumer.
- Payment scheme.
- SE issuer (either directly, through the TSM, or by holding the role itself).
- TSM (not required but recommended if the MCPA service is a part of multi-SE (provider) and/or multi service provider ecosystem).
- Acquirer (bilaterally or through a payment scheme).

Relationships in other, related ecosystems:

- Payment ecosystems (including contactless) for contact and contactless card (plastic) payments.

4.3.4 Mobile Network Operator (MNO)

OTA provisioning and life cycle management of an NFC payment ecosystem will most often use the MNO's mobile network. This does not necessarily mean, however, that the MNO has to have an active role in the NFC payment ecosystem, unless as an SE issuer for the UICC, or through subsidising/selling NFC-enabled handsets.

As an important stakeholder in the mobile ecosystem, however, it can be argued that the NFC payment ecosystem would benefit from the MNO's participation because of its strong distribution power and advanced mobile services experience.

The MNO is a highly active part of the NFC payment ecosystem as SE issuer when the UICC is the SE. To achieve this, the MNO must establish a relationship and/or service agreement with the following ecosystem stakeholders:

- MCPA SP (either directly or through the TSM).
- TSM (not required but recommended in a multi-service provider ecosystem).

Relationships in other, related ecosystems:

- MNO ecosystem with the consumer and handset provider (in some markets).
- NFC payment ecosystem with other MCPA SP (either directly or through the TSM).

There are also technologies for OTA provisioning and life cycle management other than solely the MNO's mobile network, such as WiFi, but since these have only minor effects on business models, this paper will not analyse them further.

4.3.5 Secure Element issuer

The SE issuer is responsible for providing the SE in the mobile contactless payment (MCP) ecosystem. In this environment, it holds a key role while controlling the SE keys and, as a result, influences the business dynamics of the NFC payment ecosystem.

To be a part of the NFC payment ecosystem, the SE issuer must establish a relationship and/or service agreement with the following ecosystem stakeholders:

- MCPA SP (indirectly through the TSM, or by holding the role itself).
- TSM (not required but recommended if the SE issuer is a part of a multi-SE (issuer) and/or multi-MCPA SP ecosystem).

Relationships in other, related ecosystems:

- NFC payment ecosystem with other MCPA SP (either directly or through the TSM).

4.3.6 Trusted Service Manager (TSM)

The TSM is a new and in some cases optional player that can play an essential role, particularly in a multi-SE (issuer) and/or multi-service provider ecosystem. For socio-economic and ecosystem reasons it is important to mitigate the cost, complexity and inefficiency of multiple bilateral agreements and non-standard solutions. There is more information about TSMs in Appendix 9.1 of this paper and in reference 3.

To be a part of the NFC payment ecosystem, the TSM must establish a relationship and/or service agreement with the following ecosystem stakeholders:

- MCPA SP.
- SE issuer (unless it acts as SE issuer itself).

Relationships in other, related ecosystems:

- NFC payment ecosystem with other MCPA SP or SE issuers.

4.3.7 Handset Manufacturer (HM) and/or platform provider

The HM has a role in the NFC payment ecosystem by manufacturing and selling NFC-enabled handsets. It can also act as an SE issuer for the embedded SE. For the sake of simplicity, the HM is assumed to include the role of a platform provider.

The HM (and/or platform provider) will most likely be a part of the NFC payment ecosystem as an SE provider for the embedded SE. To do this, the HM must establish a relationship and/or service agreement with the following ecosystem stakeholders:

- MCPA SP (either directly or through the TSM).

Relationships in other, related ecosystems:

- MNO ecosystem with the consumer and MNO (in some markets).
- NFC payment ecosystem with other MCPA SP (either directly or through the TSM).

4.3.8 Acquirer

The acquirer is responsible for handling financial acquisition in payment ecosystems. That is, it initiates the clearing and settlement of payment transactions through payment schemes and banks.

To be a part of the NFC payment ecosystem, the acquirer must establish a relationship and/or service agreement with the following ecosystem stakeholders:

- Payment scheme.
- MCPA SP (bilaterally or through a scheme).
- Merchant.

Relationships in other, related ecosystems:

- Payment ecosystem (including contactless) for contact and contactless card (plastic) payments.

4.3.9 Payment scheme

The payment scheme (card scheme) is responsible for handling agreements with scheme participants, setting fees and establishing technical, functional, branding and certification policies for scheme participants.

In addition to direct relationships with relevant ecosystems, the payment scheme will have many indirect relationships, for example, the certification of SEs and POS technology to ensure it meets the required security and interoperability standards prior to market release.

To be a part of the NFC payment ecosystem, the payment schemes must establish a relationship and/or service agreement with the following ecosystem stakeholders:

- MCPA SP.
- Acquirer.

Relationships in other, related ecosystems:

- Payment ecosystem (including contactless) for contact and contactless card (plastic) payments.
- Relationship with other MCPA SPs and acquirers.

4.3.10 Secure Element provider

The SE provider manufactures the SE used to store the MCPA.

Relationship with other stakeholders in the NFC payment ecosystem:

- The SE provider has a direct relationship with the SE issuer.

4.3.11 Point of Sale provider

The POS provider manufactures the POS.

Relationship with other stakeholders in the NFC payment ecosystem:

- The POS provider has a direct relationship with the merchant and, in some markets, with the acquirer.

Relationships in other, related ecosystems:

- Payment ecosystem (including contactless). The POS should be ready for contact and contactless card (plastic) payments.
- Relationship with other MCPA SPs and acquirers. Certification may be needed through the payment schemes.

4.4 Scope definition

One of the most difficult aspects of trying to define business models for NFC payments is the diversity of participants and the ways in which they may collaborate. Consequently, this paper focuses only on the most likely commercial arrangements:

- **Mobile contactless payments (mobile proximity or NFC payments):** other NFC services or other types of payments are outside the scope of this paper. Mobey Forum, however, acknowledges that managing NFC payments alone will not make business sense for some stakeholders and they will need to offer a complete portfolio of NFC services.
- **Payment instrument:** all payments will be card transactions. Other methods of payment (for example, direct debit or credit transfers) are out of scope.
- **Payment type:** person-to-business at the POS. Person-to-person payments are classified as remote mobile payments and are therefore out of scope.
- **Type of market:** developed markets. Even though there is no technical restriction, the paper focuses on markets where the merchant infrastructure is developed. For emerging markets, other types of payments, such as remote payments, are often more appropriate.
- **Different types of SE:** the paper tries to be non-judgemental about the SE form factor. As previously discussed, however, it covers only UICC, microSD and embedded chips, as these are currently viewed by the industry as having the greatest potential for long-term adoption.

5 Business models

5.1 Introduction

Potential business models are analysed according to ecosystem dependencies, stakeholders and the scope described in the previous sections of this paper. This also takes into account that the MCPA SP will always be the issuer of the card credentials stored in the SE. More information about operational models for sharing SEs is provided in references 4 and 5.

5.2 Types of business model

One of the most critical decisions for a payment service provider is how to cooperate with other stakeholders to go to market.

In essence there are three cooperation models:

- **Collaborative model:** in a specific region, the main stakeholders, SE issuers, MCPA SPs and other relevant parties jointly define a common landscape which allows each entity to participate.
- **Bilateral model:** in a specific region, one SE issuer and one MCPA SP reach an agreement to develop NFC payments.
- **Standalone model:** there is no cooperation. The MCPA SP and the SE issuer are the same entity.

5.3 Selected scenarios and implementation examples

As has been discussed previously, business models vary considerably depending on the SE type and which party has issued the SE, as this in turn has an impact on how much control the SE issuer has of the ecosystem.

The selected SE issuer will pre-determine some implementation scenarios. It should be emphasised once more that these scenarios are for illustrative purposes only.

For the selected types of SE, the most realistic issuers are likely to be:

- UICC: MNO as issuer, as the UICC is procured, managed and controlled by the MNO.
- Embedded chip (embedded SE): HM as issuer. Where the HM and platform provider are different entities, the important factor is which entity controls the SE. When the HM produces a handset to the specifications and requirements of a third party that owns the OS and controls the SE, then the platform provider is the key stakeholder. For simplicity, in the analysis, the HM is assumed to include the role of a platform provider.
- Secure microSD: third party, (for example, TSM or SE provider) as issuer, or MCPA SP as issuer.

In conclusion, this white paper has selected four scenarios as being viable:

- a) UICC as SE – the MNO issues the SE.
- b) Embedded chip as SE – the HM issues the SE.
- c) MicroSD as SE – a third party issues the SE.
- d) MicroSD as SE – the MCPA SP issues the SE.

Combining the selected scenarios with the business model alternatives produces twelve possible implementation cases:

	1. UICC/MNO	2. Embedded/HM	3. μ SD/TP	4. μ SD/MCPA SP
A. Collaborative	Implementation case 1	Implementation case 4	Implementation case 7	Implementation case 10
B. Bilateral	Implementation case 2	Implementation case 5	Implementation case 8	Implementation case 11
C. Standalone	Implementation case 3	Implementation case 6	Implementation case 9	Implementation case 12

Figure 5: Implementation cases

Implementation cases 10 and 11 are not deployable as the issuer of the SE is the MCPA SP. As such, there is not an option for a collaborative or bilateral model.

Of the remaining implementation cases, not all of them are realistic or present a rational business case. Some have higher potential for success than others. The next section evaluates all the cases, identifying which are the most likely to succeed.

5.4 Evaluation of implementation cases

The following simple set of evaluation criteria has been applied to examine each implementation case at a high level:

- A. Standardisation:** this explains how easy, or difficult, it will be to develop and deploy services based on the business model now and in the future, and how well the technology will be standardised.
- B. Market reach:** this refers to the proportion of the market that will be able to adopt and use this model. The wider the reach the more opportunities for mass market adoption.
- C. Ecosystem sustainability:** this addresses the long-term scalability of the solution – is there a business case for all stakeholders, will they have incentives to drive market adoption and customer care? Ecosystem sustainability can also be a result of standardisation and the market reach of the business model, and can be seen as a consequence rather than a decisive factor.

How well each implementation case meets the criteria is measured as:

- **Good** 
- **Fair** 
- **Poor** 

The implementation models' probability of success is based on their ability to achieve a high score across all evaluation criteria.

5.4.1 Standardisation

The maturity and status of the technical standards impact on the interoperability of the equipment (for example, mobile devices, secure elements, SIM cards). International and market specific standards in interfaces (for example, between the service provider and the SE issuer) have an impact on setup procedures with various SE issuers and TSMs.

In the following analysis, the different scenarios are evaluated briefly with regards to standards and interfaces. To simplify the analysis, the SEs are evaluated first, then the impact of the business model on the standards and interfaces. The scenario rating (good, fair, poor) is the outcome of these two variables.

The rating provides the answer to the question: how likely the SE solution is able to utilise standards and that the lack of existing standards is not an inhibiting factor in the development of NFC services.

- **Good** means that sufficient standards are in place to support the development of NFC, and technical interoperability is clear from the end user and service provider point of view.
- **Fair** means that some parts of the implementation must involve proprietary technologies which will have an impact either on the end user or the service provider and the interoperability of NFC services.

- **Low** means that the implementation relies heavily on proprietary technologies and interoperability (from end user and MCPA SP points of view) and will be hard to achieve.

Applying these definitions to the SE types:

- **UICC – good** standardisation status: the technical standards for UICC are well established. Standards-based devices are available from some handset manufacturers for pilot implementations. Some handset manufacturers' very first models are also available in selected markets.
- **Embedded SE – fair** standardisation status: as the embedded SE cannot be removed from the mobile device, it does not require the same level of standardisation as the removable type. These devices have been available for years, both for pilots and commercially. From a standards point of view, perhaps the most relevant difference to UICC is that there is no end-to-end standardised access to the embedded SE from the trusted service platform; instead all communication must go via a proprietary proxy agent (an applet in the device and another applet in the SE). But the lack of standards is not an inhibiting factor in the development of embedded SE-based NFC services.
- **MicroSD – poor** standardisation status: there are no standards to support communication between the microSD-based SE and the NFC controller on a mobile device. Therefore, the microSD-based NFC pilot implementations have the NFC controller and the antenna embedded in the microSD card. Whether the solution works in a device depends on the physical location of the microSD card slot. There is also a risk of communication conflicts and unexpected behaviour when both the mobile device and the microSD card have embedded antennae.

The business model (collaborative, bilateral, standalone) does not have an impact on the technical standards of the mobile devices, but it may affect the interfaces that different entities use to communicate between each other in different processes.

- **Collaborative models** facilitate the development of market standards.
- **Bilateral models** focus only on the interoperability of the two entities. First movers will define the interfaces and there is no guarantee that other SE issuers will use similar interfaces and follow similar processes. Several consequent bilateral agreements in the market may cause technical implementations to fragment, unless players follow commonly agreed standards and processes.
- In the **standalone model**, the service provider implements the NFC service using the optimal interface implementation, which may be standards based or something else. Interoperability is not important here unless the service provider wants to open its SE to third parties. Technical TSMs which act as suppliers for the service provider may offer standards-based interfaces for standalone models as the market matures.

Based on the above, the following scenarios illustrate the impact of standards and interfaces on the development of NFC services:

	1. UICC/MNO	2. Embedded/HM	3. μ SD/TP	4. μ SD/MCPA SP
A. Collaborative	A	A	A	
B. Bilateral	A	A	A	
C. Standalone	A	A	A	A

Figure 6: Evaluation of implementation cases - Standardisation

5.4.2 Market reach

Market reach illustrates how many customers could be reached in different scenarios. It is defined by the following factors:

- Market share of the MCPA SPs.
- Market share of the SE issuers.
- Market share of the devices supporting the solution.

The business model has a significant impact on the issuer's market share. The availability of standards has an impact on the market share of available devices. The development of the entire NFC payment system and the sales and marketing power of those parties involved also has an impact on the market share of interested customers.

- In a **collaborative model** the selected SE option has a high or medium market reach. A number of players support the selected model, which ensures the maximisation of potential users. Joint marketing efforts, as well as customer education, means it has a greater potential to catch on fast.
- A **bilateral model** may also ensure substantial market reach, but is limited to only two players. This may, however, vary considerably depending on the market shares of the players in question. Where both are market leaders, there is always greater potential. Where both have only small market shares, the potential customer base may remain small.
- In the **standalone model**, as the MCPA SP and the SE issuer are the same, market reach depends on the entity's market share. Every effort needs to be made to achieve its potential, as this single party relies on its decisions alone and its market share of the devices supporting the solution.

Based on the above, the following evaluation can be made:

	1. UICC/MNO	2. Embedded/HM	3. μ SD/TP	4. μ SD/MCPA SP
A. Collaborative	B	B	B	
B. Bilateral	B	B	B	
C. Standalone	B	B	B	B

Figure 7: Evaluation of implementation cases – Market reach

5.4.3 Ecosystem sustainability

Even though ecosystem sustainability also depends on standardisation and the market reach of the business model, models where the MCPA SP is a traditional payment service provider seem to be more sustainable.

- In a **collaborative model**, sustainability will depend on the stakeholders' agreements. If there is a good definition of technical and commercial roles ecosystem sustainability will be equally good, but the difficulty of cooperation is directly proportional to the number of entities involved.
- In a **bilateral model** cooperation is simpler than in a collaborative model. However, the scalability of the solution is poorer.
- The **standalone model** makes more sense when the entity acting as the MCPA SP is doing so because being a payment service provider is part of its core business. It means many processes and services, such as customer care or risk management, can be shared with other payment services. Otherwise, becoming a MCPA SP could be challenging.

Taking this analysis into account, we can make the following evaluation:

	1. UICC/MNO	2. Embedded/HM	3. μ SD/TP	4. μ SD/MCPA SP
A. Collaborative	C	C	C	
B. Bilateral	C	C	C	
C. Standalone	C	C	C	C

Figure 8: Evaluation of implementation cases – Ecosystem sustainability

5.4.4 Global evaluation

Adding the single evaluation of each three criteria but also considering a cross- evaluation of how the three criteria combine, the following global evaluation of the implementation cases has been completed:

	1. UICC/MNO	2. Embedded/HM	3. μSD/TP	4. μSD/MCPA SP
A. Collaborative	Very likely A B C	Unlikely A B C	Unlikely A B C	
B. Bilateral	Likely A B C	Likely A B C	Very unlikely A B C	
C. Standalone	Unlikely A B C	Very unlikely A B C	Very unlikely A B C	Likely A B C

Figure 9: Global evaluation of implementation cases

Based on the above analysis, only the ‘**very likely**’ and ‘**likely**’ cases have been developed further in this paper:

- The MNO issues the UICC in a collaborative model.
- The MNO issues the UICC in a bilateral model.
- The HM issues the embedded chip in a bilateral model.
- The MCPA SP issues the microSD in a standalone model.

In all cases the following assumptions are made:

- The acceptance infrastructure for mobile contactless payments is in place.
- Card schemes, payment service providers (issuers and acquirers) and their infrastructures have been upgraded to accept mobile contactless payments.
- The MCPA SP obtains or develops the mobile contactless payment application.

This paper focuses on what each case offers that is new; in other words what cannot be found in a traditional payment or MNO ecosystem. In addition, it concentrates on primary stakeholders as well as considering some of the new roles played by secondary stakeholders.

5.5 The MNO issues the UICC in a collaborative model

5.5.1 Overview

In this case the MNO is the owner of the SE (the UICC) and issues the SE. Multiple service providers will be able to download their mobile applications into the UICC via a TSM.

Although using a TSM is optional, in this case it is advisable for the following reasons:

- In a collaborative model it is expected that multiple MNOs and MCPA SPs will work together as part of the mobile ecosystem. To avoid additional complexity it would be convenient for both MNOs as MCPA SPs to use an independent and central entity to provide the mobile contactless payment applications.
- A TSM could also control the commercial contracts so the MCPA SP would only need to negotiate with the TSM to get access to the UICCs of all participating MNOs, negating the need to establish multiple bilateral contracts.

In developing this case, the following hypotheses are assumed:

- There is a TSM that plays technical and commercial roles. This TSM is linked to the MNOs and the MCPA SPs. It is recognised that in some markets there may be multiple TSMs.
- The MCPA SP and the TSM have a direct commercial relationship with an agreed contract.
- The MNO and the TSM have a direct commercial relationship with an agreed contract.
- The TSM provides customer support and manages the customer life cycle.
- The TSM develops the user interface.

The technical and commercial relationships between the MCPA SP, MNO and TSM are shown in the following diagram:

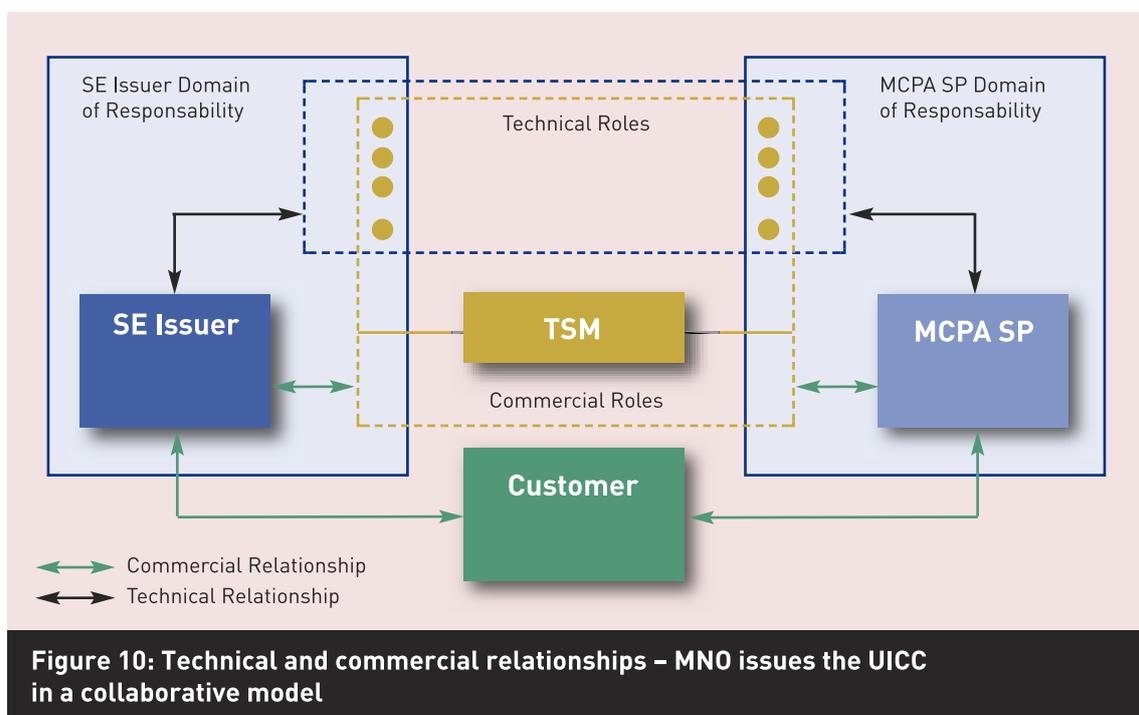


Figure 10: Technical and commercial relationships – MNO issues the UICC in a collaborative model

The stakeholders involved in this implementation are highlighted in the diagram below:

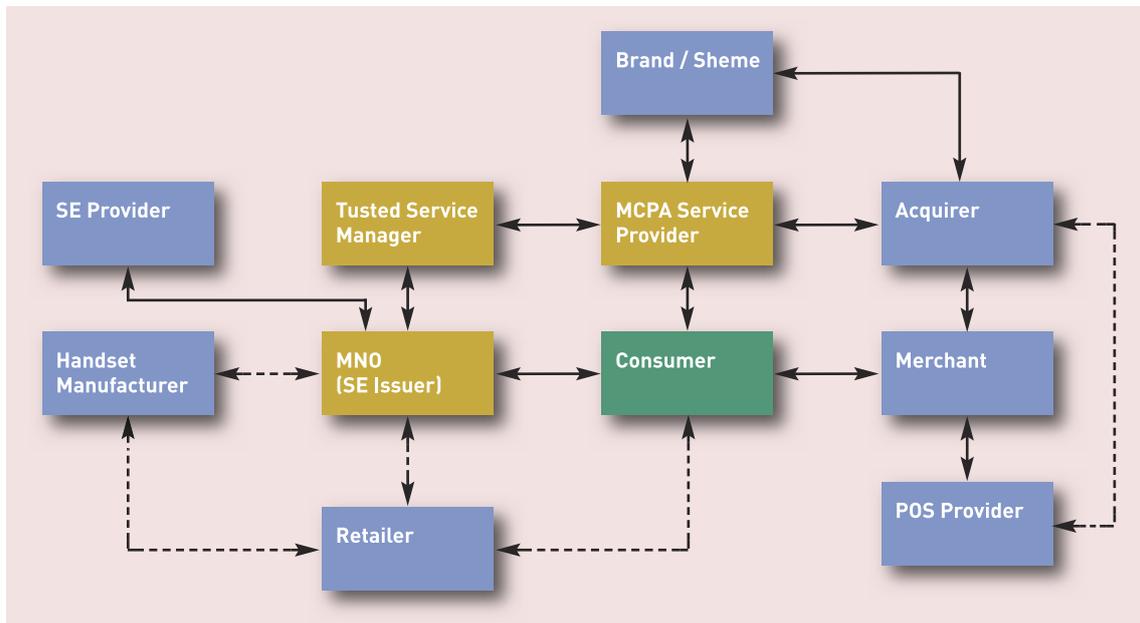


Figure 11: Ecosystem – MNO issues the UICC in a collaborative model

There are three primary stakeholders: the MNO, the MCPA SP and the TSM.

5.5.2 Business rationale and expenditures

The main reason for MNOs and MCPA SPs to work together in this model is the level of reach they can achieve. It is more difficult for each player to operate on their own or in a bilateral model, unless there is only one MNO and one MCPA SP in the market.

This case will suit markets with a limited number of MNOs and MCPA SPs in a specific market segment. By joining forces and creating a collective mobile ecosystem, they will attain a higher market share.

The potential drivers for primary stakeholders to develop this case are:

	MNO	MCPA SP	TSM
Direct value	<ul style="list-style-type: none"> Revenue from TSM: Renting available space on the UICC and potential fees for lifecycle management. Revenue from customer: Extra fee for advanced UICC or NFC services. 	<ul style="list-style-type: none"> Revenue from customer: New services fees. Revenue from schemes: Increase transaction volumes. 	<ul style="list-style-type: none"> Revenue from MCPA SP: OTA Services (provisioning and life cycle management). Revenue from MNO: Hosting (for outsourced OTA services).
Indirect value	<ul style="list-style-type: none"> Churn reduction: UICC as "card storage and Secure Element" makes it more troublesome for customer to change MNO. Increase network traffic from adjacent services: SMS and data. 	<ul style="list-style-type: none"> Customer satisfaction and retention: Protect core business. Increase loyalty. Cash handling reduction. 	<ul style="list-style-type: none"> HUB function: Building value added services and extended TSM services.

Figure 12: Business rationale – MNO issues the UICC in a collaborative model

The following cost elements have been identified:

	MNO	MCPA SP	TSM
CAPEX	<ul style="list-style-type: none"> • SIM card redesign and reissue to enable accommodation of card payment apps. • Establish customer support procedures 	<ul style="list-style-type: none"> • Obtain/Build payment application. • Develop provisioning & personalisation process including customer registration process and customer life cycle management. • Establish links to TSM • Update disputes processes • Establish customer support policy and procedure • Card member marketing • Upgrade systems for mobile contactless transactions 	<ul style="list-style-type: none"> • Build infrastructure for OTA provisioning and personalisation and application life-cycle management • Build application to allow user to manage card payment apps (user interface). • Establish and build links to Service Providers and MNOs • Establish secure data management infrastructure • Customer care infrastructure.
OPEX	<ul style="list-style-type: none"> • Promotion (marketing) • Customer care. • Testing new NFC handset features 	<ul style="list-style-type: none"> • Card member marketing. • Potential increased issuing costs. • Customer care. • Different transaction economics due to Low Value Transactions. 	<ul style="list-style-type: none"> • Provisioning and Personalisation process: OTA. • Provisioning and personalisation and lifecycle management • Customer care

Figure 13: Expenditures – MNO issues the UICC in a collaborative model

For other secondary stakeholders, there is also the following relevant CAPEX:

- HMs: develop new NFC handsets based on UICC as SE.
- UICC providers: develop new UICC.

5.5.3 Technical and infrastructure considerations

The TSM becomes the main focus of this model, and will provide technical roles for MNOs and MCP SPs. There is a huge technical dependency on the TSM. As this party is a new member of the MNO and payments ecosystem, it will take time before it is geared up for full-scale, mass market operation.

5.5.4 Market considerations

All MCPA SPs have the same opportunities: an MCPA SP depends on itself to launch the service once the TSM is built. Differentiation between MCPA SPs could be difficult.

5.6 The Mobile Network Operator issues the UICC in a bilateral model

5.6.1 Overview

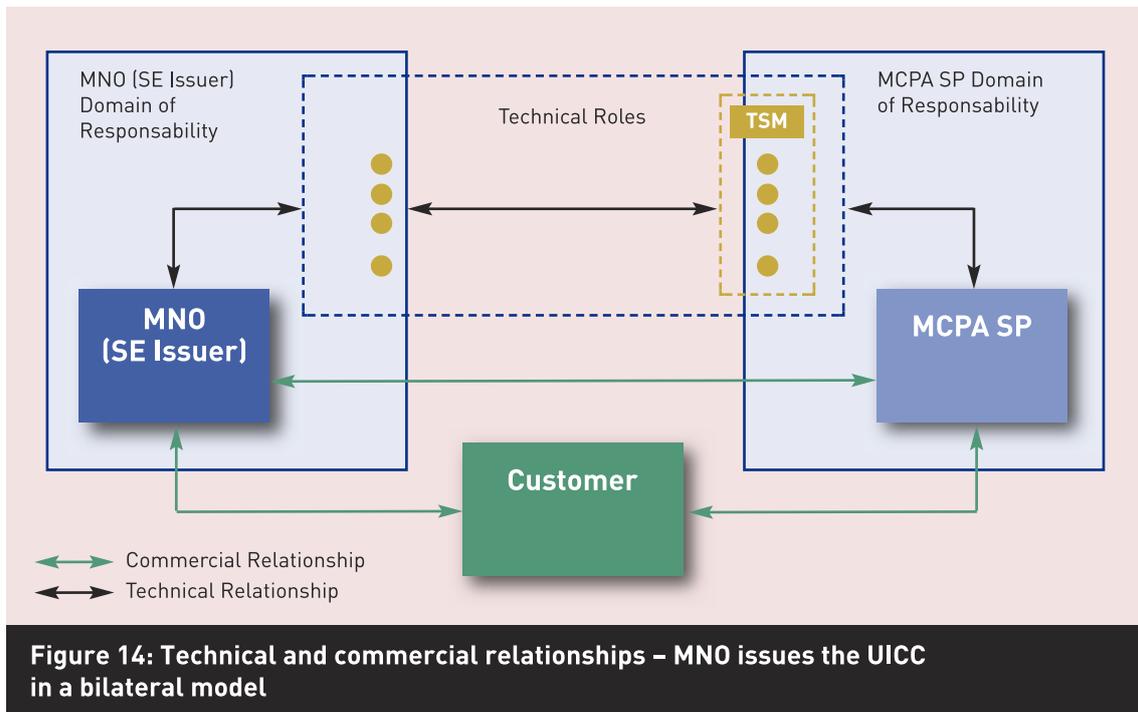
As in the previous implementation case, the SE is the UICC. Therefore, once again, the issuer of the SE is the MNO which owns the UICC and controls the SE keys that allow the secure download of the MCPA.

In a bilateral model it makes sense to have a direct commercial relationship between the two primary stakeholders: the MNO and the MCPA SP.

In developing the case, the following hypotheses are assumed:

- The MNO and the MCPA SP have a direct commercial relationship with an agreed contract.
- The MNO directly performs all the technical roles with its own infrastructure and does not use a TSM.
- The MCPA SP uses a TSM to perform some of its technical responsibilities.
- Both the MCPA SP and the MNO provide customer support and manage the life cycle of their individual customers.
- The MNO develops the user interface.

The technical and commercial relationships between the MCPA SP and the MNO are shown in the following diagram:



The stakeholders involved in this implementation case are:

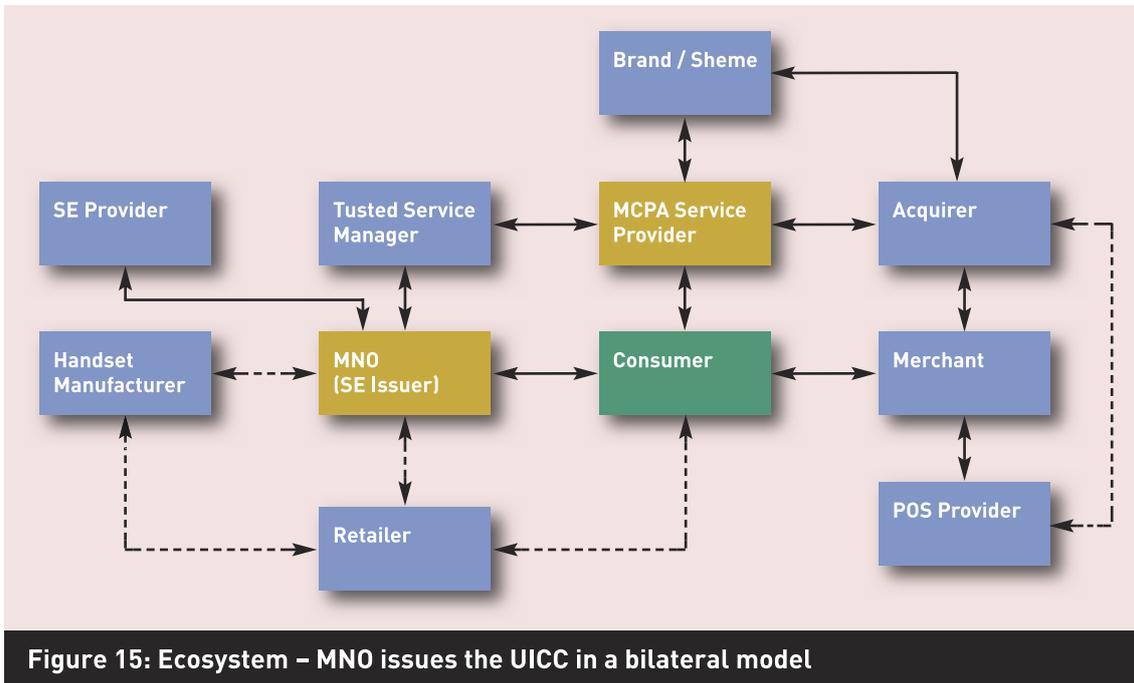


Figure 15: Ecosystem – MNO issues the UICC in a bilateral model

The primary stakeholders in this case are the MCPA SP and the MNO.

5.6.2 Business rationale and expenditures

Although the simplest way for a bank to achieve mass market penetration is a collaborative model, in many domestic markets it may be impracticable due to the complexities involved in getting agreement between all required parties. Furthermore, the development and implementation period could be protracted.

Therefore, the adoption of the bilateral model will appeal to markets where:

- There is a leading MNO and a leading MCPA SP.
- There are several major operators and MCPA SPs but no global cooperation agreement.
- A single MCPA SP and a single MNO want to quickly launch the service or be first to market.

The main benefits for key stakeholders developing this case are:

	MNO	MCPA SP	TSM
Direct value	<ul style="list-style-type: none"> Revenue from MCPA SP : Renting available space on the UICC and potential fees for lifecycle management. Revenue from customer: Extra fee for advanced UICC or NFC services. 	<ul style="list-style-type: none"> Revenue from customer: New services fees. Revenue from schemes: Increase transaction volumes. 	<ul style="list-style-type: none"> Revenue from MCPA SP: OTA Services (provisioning and life cycle management)
Indirect value	<ul style="list-style-type: none"> Reduced churn: UICC as "card storage and Secure Element" makes it more troublesome for customer to change MNO. Increase network traffic from adjacent services: SMS and data. 	<ul style="list-style-type: none"> Customer satisfaction and retention: Protect core business. Increase loyalty. Reduced cash handling. 	

Figure 16: Ecosystem – MNO issues the UICC in a bilateral model

The following costs have been identified:

	MNO	MCPA SP	TSM
CAPEX	<ul style="list-style-type: none"> • Build infrastructure for OTA provisioning and personalisation and application life-cycle management. • Build application to allow user to manage card payment apps. • Establish and build links to TSM. • SIM card redesign and reissue to enable accommodation of card payment apps. • Establish customer care systems. 	<ul style="list-style-type: none"> • Obtain/build a payment application • Develop provisioning & personalisation process including customer registration process and customer life cycle management. • Establish links to TSM. • Update disputes processes. • Establish customer support policy and procedure. • Upgrade systems for mobile contactless transactions. 	<ul style="list-style-type: none"> • Establish secure data management infrastructure • Build infrastructure for OTA provisioning and personalisation and application life-cycle management. • Establish and build links to MNO and MCPA SP.
OPEX	<ul style="list-style-type: none"> • Marketing • Provisioning and Personalisation process: OTA, • Provisioning and personalisation and lifecycle management. • Customer care. • Testing new NFC handset features 	<ul style="list-style-type: none"> • Card member marketing. • Potential increased issuing costs. • Customer care. • Different transaction economics due to Low Value Transactions. 	<ul style="list-style-type: none"> • Provisioning and Personalisation process: OTA, • Provisioning and personalisation and lifecycle management.

Figure 17: Expenditures – MNO issues the UICC in a bilateral model

For other secondary stakeholders, there is also the following relevant CAPEX:

- HMs: develop new NFC handsets based on UICC as SE.
- UICC providers: develop new UICC.

5.6.3 Technical and infrastructure considerations

In this scenario, the MNO has to put more effort into technical development than in the collaborative model. For the MCPA SP, though, its input is similar as the TSM absorbs its technical roles. It is more difficult to ensure standardisation, however, if the MCPA SP wants to connect to other MNOs.

5.6.4 Market considerations

This model is good if the stakeholders are market leaders. If not, it could be difficult to attain acceptable market penetration. If the potential market share is not very high, the alternative for an MCPA SP is to replicate the bilateral relationship with other MNOs.

5.7 The Handset Manufacturer issues the embedded chip in a bilateral model

5.7.1 Overview

In this scenario, the SE is an embedded chip in the handset and the issuer is the HM. The HM is also the platform provider. It is important to note, however, that in some cases the HM is not the platform provider, but handsets are manufactured to the requirements of the platform provider. In such cases, it is the platform provider which controls the SE.

Therefore, the HM or platform provider is now a primary stakeholder and controls the SE keys that allow the secure download of the MCPA.

As this is a bilateral model, a direct commercial relationship between the primary stakeholders, the MCPA SP and the HM is assumed. In addition, the following assumptions are made:

- Both the MCPA SP and the HM/platform provider directly perform the technical aspects. There is no need for a TSM.
- Both the MCPA SP and the HM/platform provider provide customer support and manage the customer life cycle.
- The HM/platform provider develops the user interface.

The technical and commercial relationships are shown in the following diagram:

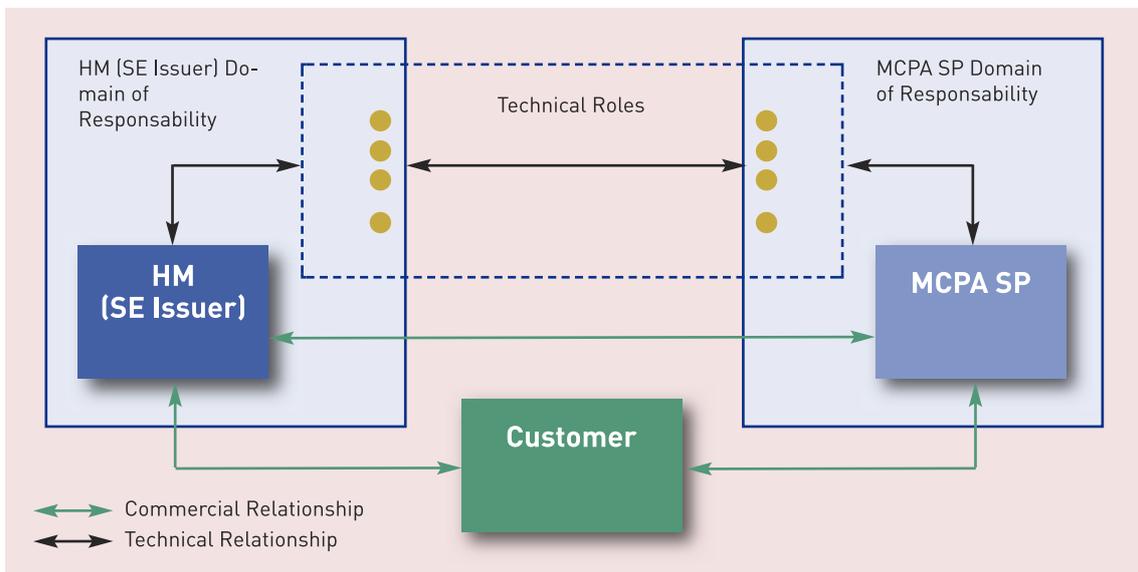


Figure 18: Technical and commercial relationships – HM issues the embedded chip in a bilateral model

The stakeholders involved in this implementation case are:

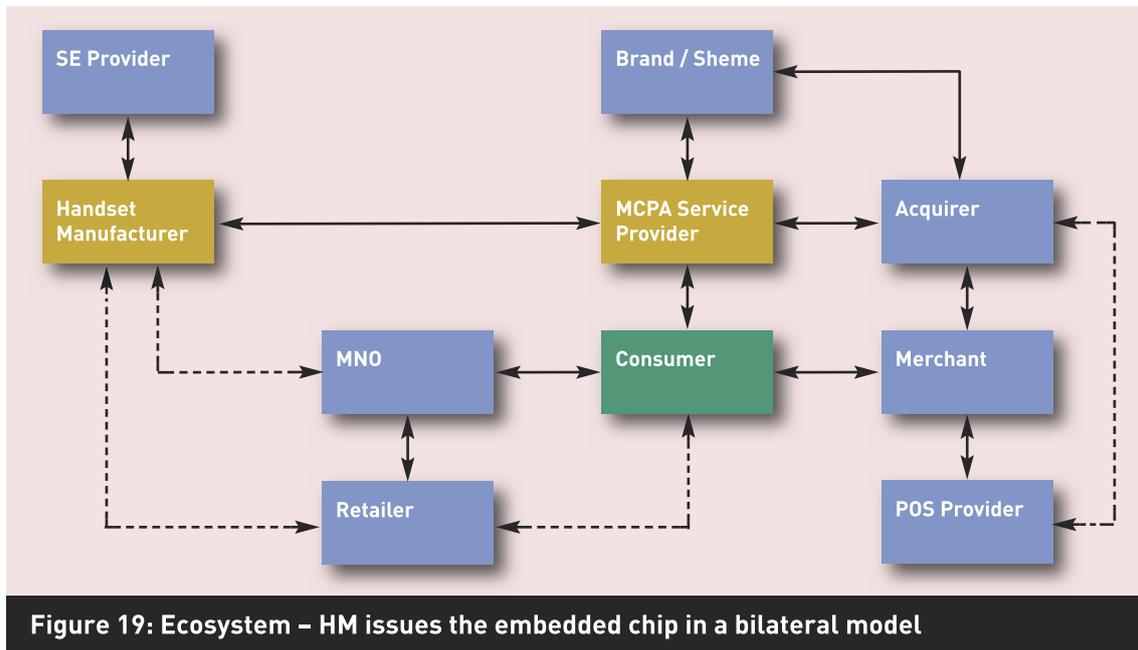


Figure 19: Ecosystem – HM issues the embedded chip in a bilateral model

The two primary stakeholders are the HM and the MCPA SP.

5.7.2 Business rationale and expenditures

It is certainly possible that some HMs or platforms providers, particularly those with a strong market position, could launch handsets with an embedded chip as the SE. Furthermore, there will eventually be handsets that can handle more than one type of SE.

If handsets with an embedded SE prove successful, the MCPA SP should establish an agreement with the respective HMs if it wants to give its customers access to mobile contactless payments via these devices.

The main benefits for key stakeholders developing this case are:

	MNO	MCPA SP
Direct value	<ul style="list-style-type: none"> Revenue from MCPA SP: Renting available space on the embedded chip and potential fees for lifecycle management. 	<ul style="list-style-type: none"> Revenue from customer: New services fees. Revenue from schemes: Increase transaction volumes.
Indirect value	<ul style="list-style-type: none"> Customer satisfaction. 	<ul style="list-style-type: none"> Customer satisfaction and retention: Protect core business. Increase loyalty. Reduced cash handling.

Figure 20: Business rationale – HM issues the embedded chip in a bilateral model

The following costs have been identified:

	HM	MCPA SP
CAPEX	<ul style="list-style-type: none"> • Build infrastructure for OTA provisioning and personalisation and application life-cycle management. • Build application to allow user to manage card payment apps. • Establish secure data management infrastructure • Establish and build links to MCPA SP. • Handset development of new handsets with embedded chip. • Establish customer care systems. 	<ul style="list-style-type: none"> • Obtain/build a payment application • Develop provisioning & personalisation process including customer registration process and customer life cycle management. • Establish links to HM. • Update disputes processes. • Establish customer support policy and procedure. • Upgrade systems for mobile contactless transactions.
OPEX	<ul style="list-style-type: none"> • Promotion (marketing) • Provisioning and personalisation process: OTA, • Lifecycle management. • Customer care. 	<ul style="list-style-type: none"> • Card member marketing. • Potential increased issuing costs. • Customer care. • Different transaction economics due to Low Value Transactions.

Figure 21: Expenditures – HM issues the embedded chip in a bilateral model

5.7.3 Technical and infrastructure considerations

In this scenario, a TSM is not included, which means that MNOs and the MCPA SP have to invest considerable resources in the advancement of the technical infrastructure. An alternative for the MCPA SP could be to use a TSM to avoid this in-house development. In addition, if the bilateral relationship is replicated with other HMs/platform providers, standardisation could be a key way of simplifying deployments.

5.7.4 Market considerations

This model could be implemented if you wanted to reach consumers that use mobile phones that support only this type of SE. This only makes sense if the HM has a significant market share in terms of volume or value.

It could also be deployed in markets where more than one SE option is available, such as UICC and embedded chip, but where the second is more profitable.

5.8 The MCPA SP issues the microSD in a standalone model

5.8.1 Overview

In this case, the MCPA SP will have to play a number of different – but compatible – roles in the complex proximity payment ecosystem. Due to the broad standalone positioning, the MCPA SP is forced to ‘adopt’ the NFC payment ecosystem and accept greater business risks than with a shared or collaborative approach in terms of both investment (development and deployment) and maintenance costs. The MCPA SP can, however, build the business case independent of other stakeholders, solely based on its knowledge, information, facts and forecasts. Therefore, the MCPA SP will have to be of considerable size and have a strong, trusted brand.

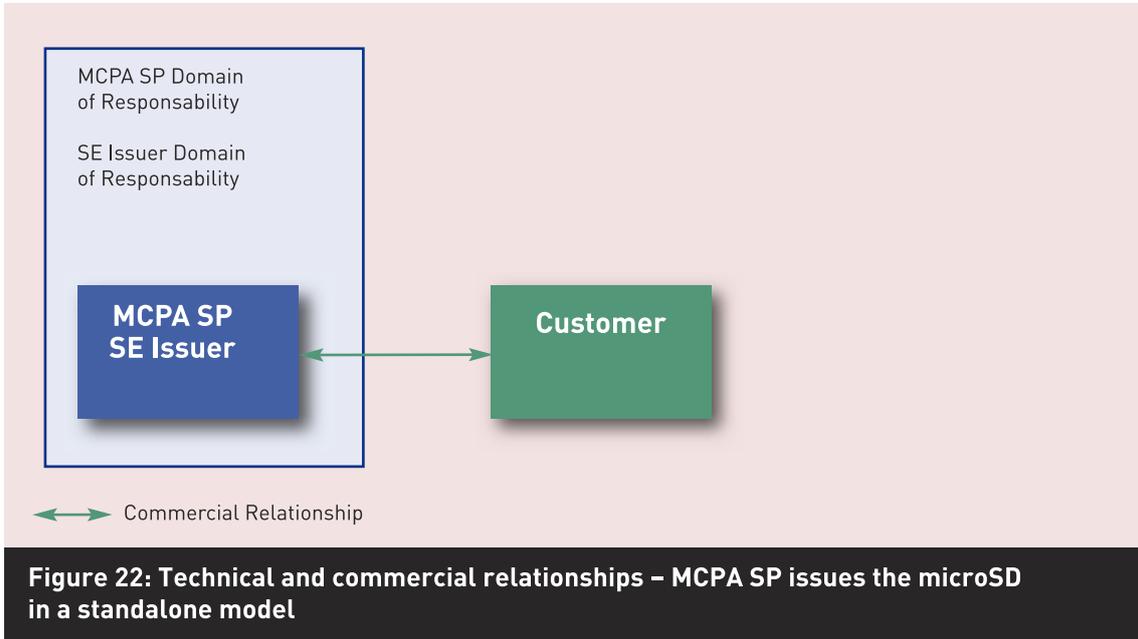
In this standalone scenario, players would typically issue a downloadable user interface. In certain cases, the download would be available through the HM or platform provider’s application store.

As the MCPA SP will be in charge of the ecosystem, it could also evolve the user interface into a mobile wallet. In addition, the microSD could host a number of third party mobile applications, which the MCPA SP can control and monetise.

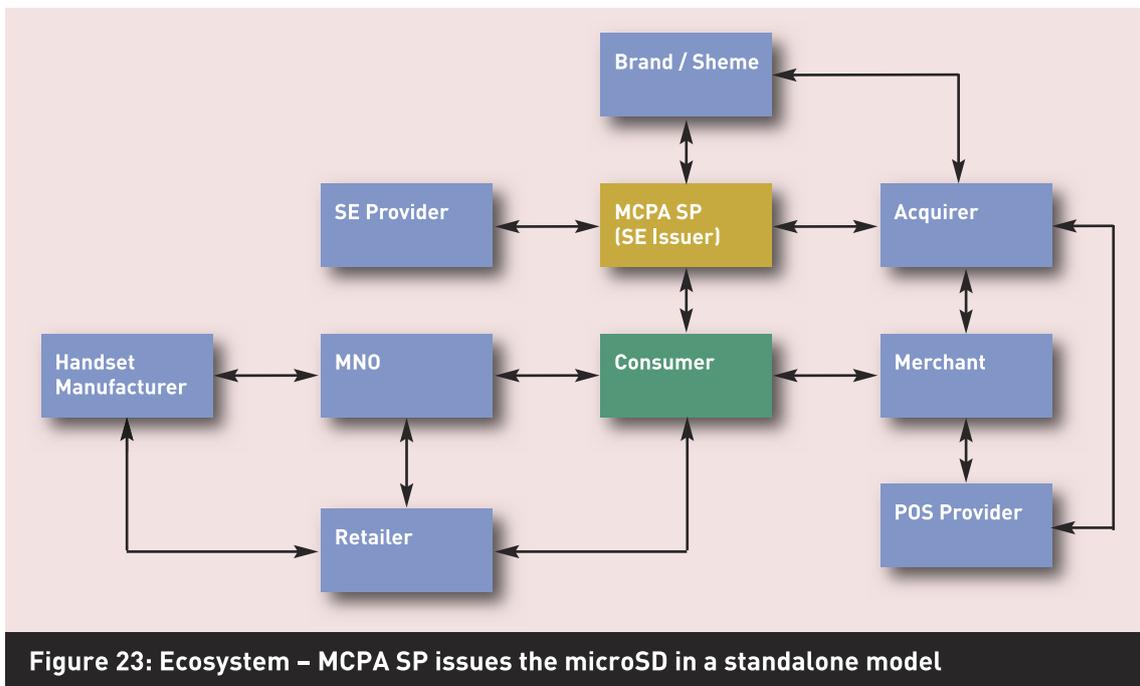
In developing the case, the following hypotheses are assumed:

- There is no TSM with a technical or commercial role.
- The MCPA SP can offer commercial relationships to third parties for multi-function applications, such as transit, ticketing or remote payments. The MCPA SP would have to establish and maintain some form of technical relationship with these third parties.
- The MCPA SP provides customer support and manages the customer life cycle.
- The MCPA SP develops, deploys, distributes and maintains the user interface.
- The MCPA SP distributes and maintains the SE.

Not including third party relationships, in this scenario there are no technical relationships and there is only one commercial relationship, between the MCPA SP and the customer:



This situation makes the ecosystem less complex as there is only one primary stakeholder, the MCPA SP:



5.8.2 Business rationale and expenditures

The main reason why a company would want to take on all primary stakeholder roles is to control the entire NFC payment ecosystem in a region. The single player gains control of the customer relationship. It can also independently offer payment and other NFC-related products and services from a position of strength in the value chain. Plus it manages the provision of additional financial services to customers and merchants, as well as payment processing and clearing-related revenues.

Only companies that own a number of end-user relationships would consider adopting this model. They also need to have a solid technological base and considerable experience of transaction management. This expertise will allow the MCPA SP to assume all roles without expending too much effort or resource.

A key driver for such companies is the fact that the technology is ready and available now – and it works. In theory, NFC-equipped microSD can ‘NFC enable’ more than 70% of all phones. To enable existing customers’ devices, the standalone player simply has to dispatch the relatively inexpensive microSD cards which many customers are already familiar with as storage cards.

The sole player is responsible for all aspects of expenditure and investment as well as future revenue opportunities. These have to be commercially evaluated and measured to ensure a good return on investment.

The main benefits for the standalone stakeholder developing this case are:

	MCPA SP
Direct value	<ul style="list-style-type: none"> • Revenue from customer: New services fees. • Revenue from schemes: Increase transaction volumes. • Revenues from 3rd Parties: renting available space on the MicroSD and OTA Services (provisioning and life cycle management).
Indirect value	<ul style="list-style-type: none"> • Customer satisfaction and retention: Protect core business. Increase loyalty. • Reduce cash handling. • Revenue shares from 3rd party applications. • MicroSD as an open development platform for new mobile marketing, advertising and transactional services.

Figure 24: Business rationale – MCPA SP issues the microSD in a standalone model

The following costs have been identified:

MCPA SP	
CAPEX	<ul style="list-style-type: none"> • Obtain/Build payment application. • Establish distribution chain of SE. • Develop provisioning & personalisation process including customer registration process and customer life cycle management. • Establish customer care infrastructure, support policy and procedure.
OPEX	<ul style="list-style-type: none"> • Card member marketing. • Distribution of SE. • Provisioning, personalisation and life cycle management. • Testing mobile phones. • Operate distribution chain

Figure 25: Expenditures – MCPA SP issues the microSD in a standalone model

5.8.3 Technical and infrastructure considerations

This approach does not require TSM integration and enables a faster time to market. TSM integration may have some benefits and can be considered in the future.

Other technology and infrastructure issues to consider include regulation and certification, particularly of the microSD. It is therefore important to implement consistent and standard card application life cycle management processes.

Finally, if the standalone player wants to make the SE on the SD card available to other application issuers, it needs to standardise the operating environment, a highly complex task.

5.8.4 Market considerations

In the standalone model, the MCPA SP owns and controls the SE and can potentially charge other issuers to host applications. The MCPA SP can impose restrictions on what applications are placed on the microSD, as well as use proprietary handset applications so it controls branding, advertising and other aspects of mobile applications.

The microSD scenario seems more likely to be used in the early stages of mobile payment ecosystem development, in places where collaborative models do not exist or have stalled. As such, microSD's swift time-to-market could become a key competitive advantage.

In addition, this model can be useful in reducing time to market if the MCPA SP wants to reach customers that use non-NFC mobile phones, as most have a microSD slot. In this case a ‘full NFC’ microSD is required. The solution, however, does need to be tested for each mobile device before commercial launch to ensure a satisfactory user experience: the position of the microSD slot can affect performance. For phones without a microSD slot, the feature can be enabled using a microSD sleeve.

5.8.5 Business models conclusions

The business analysis aims to narrow down the implementation models to deliver some concrete, commercially viable examples.

Each scenario offers a different business model because of its different approach. What they all demonstrate is that it is possible to identify revenue sources for each stakeholder if the ecosystem and the implementation are well defined. Potentially, these revenue sources can become positive business cases.

Most industry players will be able to identify which of these implementation cases best align with their commercial requirements and technical capabilities, although they will probably not fit exactly. Additionally, some players may decide to explore more than one scenario simultaneously and their business models will be the sum of the different cases.

Some projects are reviewed from a business model perspective in Appendix 9.2, ‘Practical examples of certain implementation cases’.

6 Gap analysis

One of the goals of this paper is to identify the general basis for the commercial rollout of NFC payments services. This is a complex process due to the myriad of implementation and launch possibilities. It is however possible to identify some key technical and business issues and their reciprocal relationships.

6.1 Technical issues

Even though the technology is available, many issues still need to be considered by the market. These include:

- **Common guidelines:** it is quite clear what a MCP is, however, there are some ambiguous aspects. Global guidelines will assist MCP SP to proceed, regardless of the model they choose to use. As a minimum, the following should be covered: cardholder verification method (CVM), risk management, OTA and user interface.

Some of these issues are linked and this should be taken into consideration. For example, regardless of which CVM is used – such as a mobile code, personal code or passcode – the acceptance infrastructure should be able to support it at a POS, MCPA and user interface level.

- **Acceptance infrastructure:** in most countries the contactless acceptance infrastructure is not yet deployed. Obviously, this is a precondition to enable MCP. Even where it is established, it may need to be updated to facilitate high-value MCP transactions, as many current MCP infrastructures are based on the purchase of low ticket items. Furthermore, many contactless mass transit systems do not operate on EMV and will need to be adapted if they are to provide a seamless service.
- **NFC handsets:** the availability of NFC handsets is currently very poor. Although there is often news of new NFC handsets, it is still difficult to purchase them. In addition, there will be a time delay between the launch of new NFC handsets and their full market penetration, and only high-end devices will initially be NFC-enabled. It is unlikely that customers with the latest smart phones will be willing to change their mobile simply for NFC capability, especially if the NFC handset has inferior functionality compared with

their current device. Even where handsets are claimed to be NFC-capable, often the secure payments functionality is not enabled. Bridging technologies such as microSD cards or stickers may be the way to achieve a bigger market share more rapidly.

- **Availability of SE:** new NFC handsets should support at least one type of SE and card emulation mode. Handsets with Single Wire Protocol (SWP) can use UICC as the SE. Others have an embedded chip, and some devices can support more than one SE type. Although most mobile devices potentially have the capacity to support one or two types of SE, they are not yet ready in terms of software, as the handset's firmware is not prepared. This means fully NFC-enabled devices are needed that support card emulation managing at least one SE.

The availability of full NFC microSD (integrating NFC features) is also very limited. It may become a bridging technology but only a limited range of secure NFC microSDs are available. It is also difficult to envisage how some of these SEs can accommodate the multiple service provider relationships consumers will eventually demand.

- **Contactless terminals (contactless POS):** there are relatively few terminals on the market that support high- and low-value contactless payments and more than one type of CVM. A more powerful range of NFC contactless terminals is needed.
- **MCPA (applet):** the availability of MCPAs is low, although some international schemes are developing their own.
- **User interface (midlet):** the midlet has a major impact on the user experience and at present there is inadequate market understanding of midlet usability. Different approaches can be taken but the focus should always be on ease of use.
- **Infrastructures and systems:** in relation to cooperative or bilateral models, the current MCPA SP and SE issuer infrastructure should be evolved to enable connectivity. Also, internal systems should be updated to manage MCPA and mobile contactless transactions.
- **Certification:** the end-to-end chain should be certified, including the OTA process, the MCPA, the SE, the POS, etc. A certification process needs to be defined.

6.2 Business issues

NFC payments are a new contactless payment service where the form factor is the mobile phone. The mobile device is one of the greatest advances of the past few years, not only in terms of volume and penetration but also in terms of speed to market. It has completely changed the way people interact. Now there is a new and powerful extra feature: the ability to conduct proximity payments. Enabling this, however, is complex as it requires the creation of a new ecosystem.

In fact, many of the previous technical issues related to the availability of a full range of solutions are a consequence of the difficulty of building the new NFC payments ecosystem. It is a classic chicken and egg problem.

HMs have not yet fully invested in NFC because their main customers, the MNOs, have not ordered NFC handsets. MNOs are waiting for the ecosystem to be built before making a commitment. This goes for other stakeholders, such as SE and POS providers.

As explained in this paper, there are different ways in which stakeholders can cooperate. The examples outlined represent just a few of the more likely scenarios, but there are many possibilities, each appealing to different markets and different requirements.

For the MCPA SP, which way – or ways – to go to market is the first area to analyse. This will depend on its assets and strategy as well as on the market(s) in which it wants to operate. Once this is clear the MCPA SP can define the steps it needs to take and where it needs assistance. Furthermore, at this point, it can define in more detail the business case and how it can derive revenue from this new service.

As shown by the selected use cases, the main revenue source for the MCPA SP is the potential growth in fees and transactions. On the fee side, the business case is clear: in markets where customers pay an annual fee for a card, the MCPA SP can increase revenue.

As the new form factor offers customer convenience, the number of transactions is expected to increase, particularly in low-value payments. As trials and pilots demonstrate, consumers will replace some cash transactions with MCP, potentially cutting costs for banks.

In many markets, however, existing rules are not designed for low-value payments, and this could mean that the acquirer would lose money on certain transactions. As a result, new interchange fees between institutions and new types of merchant commissions are probably needed to promote this form of low-value payment.

In terms of expenditure, the most significant differences occur at the issuing stage. In cooperative or bilateral models, an agreement is needed to download the MCPA in a SE, and the MCPA SP should pay a fee to the SE issuer (if there is a direct commercial relationship) or to the TSM (if there is an indirect commercial relationship). The size of this fee is very important to define the business case: which will work if the fees are aligned to the cost of producing a contactless plastic card.

In summary, to launch a commercial service a MCPA SP needs to:

- Have a clear idea of how to go to the market. This means defining which business and technology models fit its strategy and the market in which it operates.
- Define a clear business case considering:
 - Revenues and expenditures and if some market rules such as low-value contactless interchange fees and commissions need to be altered.
 - Issuing process and life cycle management costs.
 - Other benefits such as customer retention.

7 Conclusions and recommendations

7.1 Conclusions

Current trials and pilots show that customers are ready to pay with their mobile devices and enjoy doing so. Assuming this is true for the wider population and that services meet customers' expectations, it seems mobile contactless payments will soon be a reality and a resounding success.

The technology exists and is ready to go live. The focus now needs to be on making MCP a reality, by increasing the number of implementations and building an understanding of best practice and standards within the industry. From a business perspective, it is possible to find an implementation model that fits the needs of each stakeholder and supports their commercial requirements. There are dozens of possibilities, some of which this paper has analysed to illustrate their potential.

It is too early to predict which MCP model will be favoured by consumers and businesses. This is likely to vary within different regions depending on a range of factors including existing infrastructure and the number of stakeholders.

Another consideration is the SE technology, which is quickly evolving. Something that two years ago was difficult to achieve is now becoming common practice. Mobile devices may have more than one type of SE and therefore potentially more than one type of SE issuer. Although this offers increasing choice to stakeholders, it also makes the ecosystem more complex.

Summary:

- Mobile contactless payments will happen as customers experience the benefit of them and demand them: there is a business opportunity to meet this demand.
- The technology is ready but at an early stage in terms of device and terminal availability. It is expected, however, that this will change dramatically in the short-to-medium term.
- There are many implementation models to choose from. Every MCPA SP needs to identify which model best suits its own strategy and market.

- A detailed business case can be defined for each implementation model, even where the benefits, such as loyalty, are difficult to measure.
- Interoperability is a key factor. Although most customers conduct their transactions in just one domestic market, they should be able to effectively replicate this abroad. Because of different implementation options, however, the consistency of the customer experience cannot be guaranteed. Resources need to be invested to ensure merchants can accept MCP from a wide range of issuers, domestic and international.
- The global infrastructure will be created through the connection of all the individual stakeholders and implementation models, with successful elements being adopted as best practice and becoming the standardised approach.

7.2 Recommendations

This paper recommends that the MCPA SP:

- **Starts considering the options available to deliver MCP, even if there is no immediate plan to roll out the service.** Although customers are not currently demanding the ability to make MCP, this is likely to happen in the short-to-medium term, particularly in those territories where contactless card infrastructure is being deployed. Time to market could provide a competitive advantage.
- **Add other innovative, convenient and easy-to-use services such as couponing and loyalty cards that will help to create demand,** possibly in conjunction with retail or other partners. Although payments will be one of NFC's main applications, it alone is not sufficient to develop and drive forward the ecosystem.
- **Synchronise MCPA implementations in geographical areas where an NFC environment has been or can be efficiently created.** The merchant infrastructure needs to be established and operational. A high density of contactless terminals will ensure customers can easily use their MCPA. Acceptance also requires merchant education and common signage.
- In terms of card products for this new form factor (the mobile phone), it is important that **customers can choose payment products with which they are already familiar.** This applies to both brand and function.
- **Decide if they will support only one or multiple implementation models.** This decision may be driven by the market and its ability to flexibly manage more than one implementation case and type of SE. Although a multi-model strategy could provide an advantage to adapt to future developments and encourage customer adoption, this approach can also consume significant resources. It is therefore recommended to focus on a single issuing strategy during the initial deployment phases.

- **Formulate a TSM strategy.** Regardless of the implementation model(s) adopted by an MCPA SP, it needs to decide if it will delegate all responsibilities to one TSM or appoint multiple TSM providers. Using one TSM is simpler, but possibly higher risk compared with a more distributed model as it significantly reduces the MCPA SP negotiation capacity when discussing future costs for ecosystem updates. It is possible to start with one TSM and add another in a second stage. In fact, the MCPA SP can apply the same policy it uses for plastic cards today.

8 Next steps

This Mobey Forum paper aims to clarify key aspects of NFC mobile contactless payment business models. The MCP environment is advancing rapidly:

- Stakeholders are building an ecosystem dependent on the requirements of domestic markets.
- Infrastructures for the OTA management of the MCPA as well as acceptance ecosystems are being developed;
- HMs are announcing the launch of new NFC devices, with some of them supporting multiple types of SE, mostly UICC and embedded chips.

This innovative landscape will deliver many consumer benefits, making it an interesting media topic, which in turn will fuel the progress of this technology and motivate businesses to bring solutions to market.

Mobey Forum is committed to ensuring it keeps its members updated on this topic. As a next step, the Business Workgroup plans to develop an in-depth understanding of all the complementary services associated with payments, such as mobile loyalty, and the marketing solutions that could soon be available.

The generic purchase process can be split into at least three stages: pre-purchase, payment and post-purchase. It is easy to imagine that the mobile channel can deliver a new way of providing promotions based on location, discount coupons and cross-selling offers, for example, particularly during the pre- and post-purchase stages. This will have an impact on product and service marketing models. Payments are, therefore only part of the NFC implementation model, and consideration needs to be given to all potential NFC business opportunities to facilitate the advancement and adoption of this technology. The role of the user interface is also becoming more important as the concept of creating a ‘mobile wallet’ – with its mix of proximity and remote payments plus other value-added services – is gaining momentum.

Mobey Forum is therefore investing resources to provide its members with a clear outline of all aspects of the NFC payment ecosystem, the business opportunities it offers and how it will enable a new way to engage with customers and facilitate financial transactions.

9 Appendix

9.1 Trusted Service Manager (TSM)

The TSM is a new, optional player introduced by the NFC ecosystem. When the TSM exists, however, it plays a fundamental role. So it is important to understand when and why it is used. More information about TSMs is provided in reference 3.

From a technical point of view, some of the TSM roles are the responsibility of the SE issuer and some the responsibility of the MCPA issuer. These roles cover the technical and security functions that are necessary for implementing the service.

In both cases, all the technical roles or a subset of them can be implemented directly by SE issuers or MCPA SPs, or indirectly using third parties. If a third party is used to manage some of these roles, it is called the TSM.

If the UICC is the SE, the MNO (the issuer of the SE) can implement the technical roles directly or by using a TSM. The MCPA SP can also implement directly the technical roles or use a TSM that may be the same TSM that the MNO uses. If the TSM used by the MNO and the TSM used by the MCPA SP are different, then the respective TSMs should be connected.

It is necessary to define a commercial relationship between the SE issuer and the MCPA SP. This relationship could be implemented directly or indirectly.

A direct relationship means that the SE issuer and the MCPA SP connect directly to each other (there is a contract between the SE issuer and the MCPA SP).

An indirect relationship means that third parties acting as commercial entities are between the SE issuer and the MCPA SP. Commercial players are likely to be needed when:

- The SE issuer wants to provide the service without having to deal with different MCPA SPs.
- The MCPA SP wants to offer the service without having to deal with different SE issuers.

An SE issuer and an MCP SP may be connected to one or several commercial parties. At the same time, direct and indirect commercial relationships can coexist.

It makes sense that in some cases the third party that carries out the technical roles and the commercial player are the same company. In this case the TSM plays technical and commercial roles.

There are potentially many combinations depending on the market conditions and the commercial strategy of SE issuers and MCPA SPs. The following examples illustrate some of the main possibilities:

- A TSM fulfils technical and commercial roles for the SE issuer and the MCPA SP:

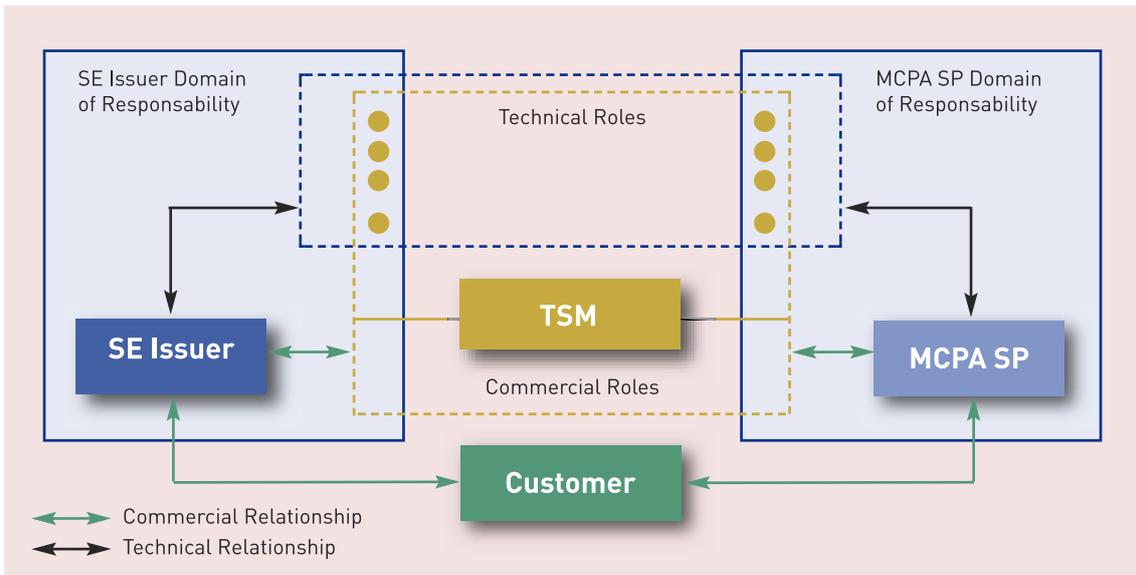


Figure 26: TSM fulfils technical and commercial roles for SE issuer and MCPA SP

- A TSM1 fulfils the technical roles for the SE issuer and a TSM2 fulfils technical roles for the MCPA SP. There is a direct commercial relationship between the SE issuer and the MCPA SP.

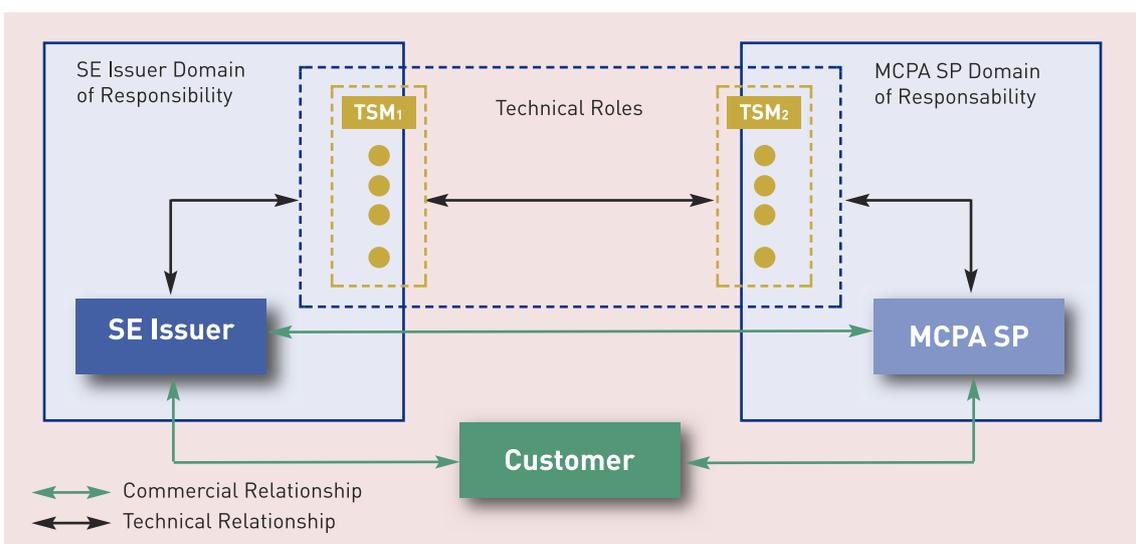
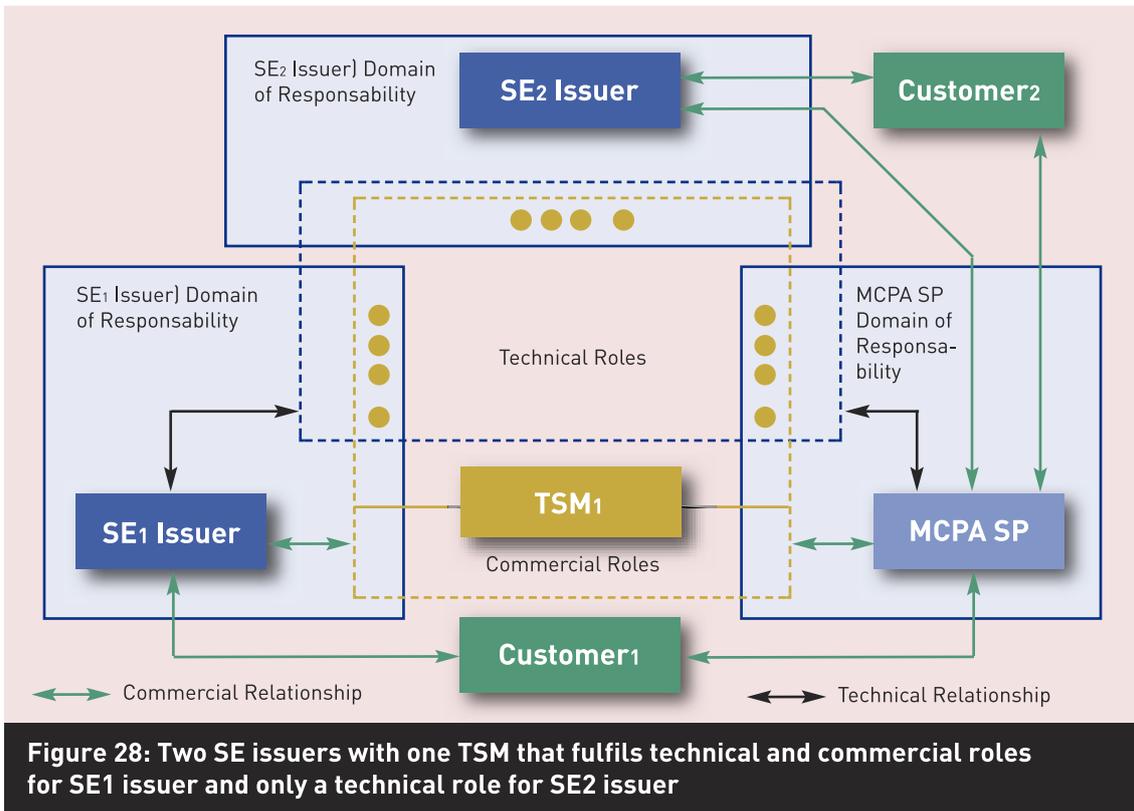


Figure 27: TSM1 fulfils technical roles for SE issuer and TSM2 fulfils technical roles for MCPA SP

- Two types of SE (SE1 and SE2). The MCPA SP uses the same TSM1 for technical roles for both types of SE. In one case, the TSM1 also fulfils the commercial roles for the MCPA SP. The SE issuer of SE1 uses a TSM1 for technical and commercial roles. The SE issuer of SE2 uses a TSM1 for technical roles but has a direct commercial relationship with the MCPA SP.



In conclusion, the TSM can play an essential role in a multi-SE (provider) and/or multi-service provider ecosystem. For socio-economic and ecosystem reasons, it is important to prevent multiple bilateral agreements and non-standard solutions.

9.2 Practical examples of certain implementation cases

Some real schemes have been selected as examples of possible implementations that follow different models. The projects are summarised and categorised according to the cases explained in section 5, 'Business models'.

• **Implementation case one:** the MNO issues the UICC in a collaborative model.

- **Dutch Six Pack:** the three largest banks and three largest mobile operators in the Netherlands have formed a joint venture to implement mobile payment using full NFC phones. The project is still in development and has not yet been launched.

The three banks involved – ING, Rabobank and ABN Amro – have about a 90% share of the market between them. The three MNOs – KPN, T-Mobile Netherlands and Vodafone Netherlands – have more than 80%. Therefore the project will cover a huge percentage of Dutch citizens. In this project the TSM is going to carry out technical and commercial roles.

It follows a collaborative model in terms of cooperation between stakeholders. As the MNOs are going to issue the SE (the UICC), the project fits implementation case one: the MNO issues the UICC in a collaborative model.

- **ISIS:** a US joint venture led by AT&T, Verizon and T-Mobile based on UICC as SE and where it was initially expected that MNOs will also issue the MCPA in a completely new payment network. Currently, its approach is changing and it seems that ISIS will use traditional card schemes instead.

Therefore, ISIS was set up using implementation case three but seems to be switching to implementation case one. At the moment, not all of the main MNOs or card issuers are involved.

ISIS is planning its first trial in Salt Lake City, Utah, in early 2012.

• **Implementation case two:** the MNO issues the UICC in a bilateral model.

- **CityZi:** CityZi, a brand of the Association Française du Sans Contact Mobile (AFS-CM), is a French NFC project that aims to create a full NFC experience that adds to the Payez Mobile NFC mobile payments solution. The project also includes other NFC services such as transportation and loyalty.

In terms of cooperation, the main MNOs – Orange, SFR and Bouygues Télécom – are issuing the UICC as the SE. A group of banks – BNP Paribas, Crédit Agricole-LCL, Crédit Mutuel-CIC, La Banque Postale, Banque Populaire, Caisse d'Épargne and Société Générale – have agreed the same technical standards for NFC mobile payments. A number of companies have developed a TSM service that complies with these standards. In terms of risk management, for high-value payments, Payez Mobile uses an offline PIN (a mobile code is typed into the mobile phone) as the CVM.

After a couple of trials in Caen and Strasbourg, where Payez Mobile was also tested, CityZi was launched in June 2010 in Nice. Even though there is a high level of cooperation between stakeholders, CityZi is not a full collaborative model, in the sense that the banks acting as the MCPA SP are using their own TSM solution provided by different suppliers and have a bilateral relationship with each MNO. Even though there is an agreement on technical standards, in terms of commercial relationships the project is closer to implementation case two: the MNO issues the UICC in a bilateral model.

One interesting aspect of CityZi is that the French government is promoting NFC services through a scheme called NFC Territories. The aim is to develop CityZi in nine French cities, including Paris, during 2011.

- **Mobile shopping:** in Sitges, Spain, the main MNO (Movistar) and the main card issuer (“la Caixa”) launched the Mobile Shopping project in May 2010.

This has put a huge effort into developing the acceptance infrastructure to achieve a very high density of contactless merchants. The acceptance infrastructure is online; for high-value payments the CVM is PIN online at the POS.

The project strictly follows implementation case two, where the main MNO issues the UICC in a bilateral model with a direct relationship with the main card issuer. The main Spanish processor is acting as a TSM and an international scheme is being used to ensure payment solution interoperability.

- **Tap2Pay:** this is a Norwegian joint venture involving a bank – DnB NOR – and an MNO - Telenor. Tap2Pay, which launched in May 2011, is being tested in a small area of Oslo and is based on UICC as the SE. The project focuses on low-value payments and the acceptance infrastructure works online. This project fits implementation case two; in terms of market share, DnB NOR has a very strong position in Norway.

- Implementation case twelve: the MCPA SP issues the microSD in a standalone model.

Mobile wallet trial: Bank of America is involved in a NFC mobile payments trial in the US using microSD cards as the SE. In this case, the microSD also includes NFC functionality (full NFC microSD). The trial started in New York and has now been extended to Atlanta and San Francisco. Bank of America’s microSD approach enables it to provide NFC mobile payments without MNOs’ participation.

- Multi-case: More than one implementation case followed at the same time.

- **Google wallet:** Google has an open approach to mobile NFC payments. Initially, it has launched its service using an embedded chip as the SE in Android handsets where Google is the SE issuer. Google also acts as the MCPA SP issuer with the Google Prepaid Card, but Citi is offering credit cards as the MCPA SP as well. Therefore, this scheme covers implementation cases six (the platform provider issues the embedded chip in a standalone model) and five (the platform provider issues the embedded chip

in a bilateral model). In the future, the service will be open to more service providers. Furthermore, Google has announced its intention to use Google wallet with other types of SE.

There are two interesting aspects to Google's approach:

- It is not going to charge fees to SPs for using the embedded SE on the Android platform.
- It is presenting a full commerce system concept with payments, loyalty cards and discount coupons (Google Offers).