smart payment association

The Next Payment Evolution

From Contactless to Mobile Payment

7th December 2010

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1. Executive summary

The card payment landscape is evolving. In most countries, credit and debit card programs are now equipped with smart card technology, causing a shift in the entire electronic payment infrastructure. Although some cardholders still have magnetic stripe cards in their wallets, the next evolutionary step has already arrived: contactless payment.

Contactless payment smart cards are ideal for replacing cash in low-value payments, as well as other services such as transport ticketing, loyalty point collection, vouchers, air-miles and many others. Consequently, contactless smart cards have a very good chance of becoming the primary method of payment for all day-to-day purchases.

While deployment of contactless technology has already begun, the next step is mobile Near Field Communication (NFC) payment. It allows issuers to load their credit or debit products onto mobile phones equipped with NFC technology. In other words, the payment product goes 'virtual'.

However, new form factors, such as contactless stickers, are also being considered by card issuers as an intermediary step to allow 'mobile' contactless payment before the full Mobile NFC environment is created.

Building on SPA members' know-how and expertise, this White Paper aims to provide a clear picture of the different technologies available today and to provide recommendations to payment product issuers for offering mobile contactless services to their customers.

2. Contactless payment: a starting point

In the year 2000, the smart card payment industry started combining high-security smart cards with the principles of RFID data transmission technology. The so-called 'contactless payment card' was invented.

Today, each card program can be turned into a contactless program in one of two ways:

▶ Pure contactless cards for magnetic stripe issuers - also known as "Magnetic Stripe Contactless" card stores data similar to the magnetic stripe.

▶ Dual Interface cards for EMV smart card programs - offers full EMV functionalities in contactless mode, in addition to the contact mode.

Migrating from magnetic stripe contactless to an EMV dual interface smart card program is very much a full EMV migration. In all cases, issuing contactless cards is the starting point for new form factors and mobile payment:
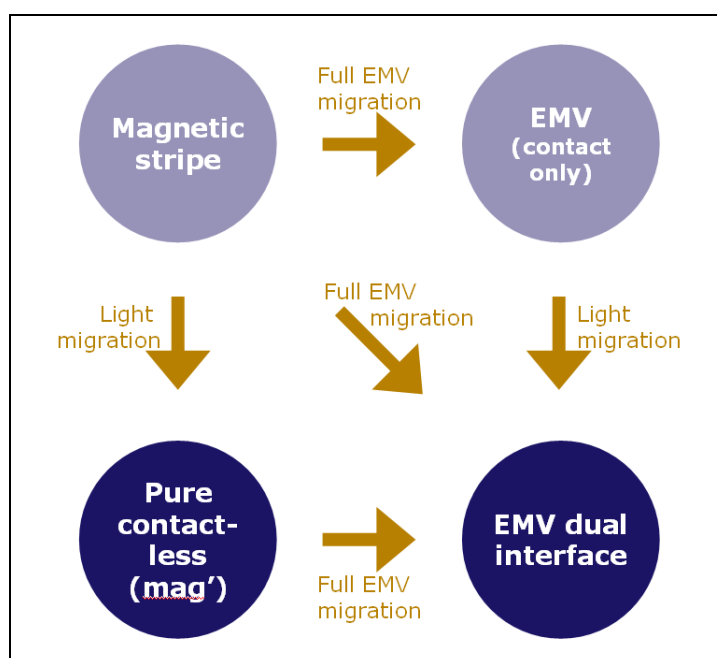
Fig. 1: Migration paths towards contactless

2.1. Why move to contactless?

Millions of people around the world are already using smart card-equipped debit and credit cards. The on-going objective for card issuers is to provide innovative services for cardholders and increase the usage of smart cards.

Contactless payment smart cards have been specifically designed to address low-value payment transactions, where speed and convenience are key factors, thus allowing issuers to convert traditional cash transactions into contactless transactions. Moving to contactless payment will almost certainly help issuers to increase card usage among consumers.

In addition to this, contactless technology brings convenience to each stakeholder, as well as new opportunities for issuers – all while maintaining the high level of security introduced by EMV smart card technology.

2.1.1. Convenient for users

Contactless cards are convenient. Why? Because contactless payment is fast and very easy to use but does not compromise transaction security.

Convenient for cardholders...
Contactless payment is easy to use - no cards have to be inserted into difficult-to-find card slots. Consumers don't even need to remove the contactless card from their wallets when paying. It's fast and requires minimal effort - just a brief motion with your hand.

In many cases, payment schemes support new rules and regulations for contactless payment transactions. For example, for small payment amounts, consumers no longer have to sign a payment receipt or enter a PIN. This speeds up the entire payment process. In many areas of life, use of contactless cards is nothing new: many office workers have already used two forms of contactless card before they even reach their desks – once on the commute to work and again to swipe into their office building.

Convenient for merchants...
The benefits are not just limited to the cardholder. As virtually no mechanical parts are involved in processing the transaction, the durability of contactless acceptance readers is much higher and maintenance costs lower. Additionally, transaction speed increases the merchant's throughput. With contactless, everything is much easier.

2.1.2. Opportunities for issuers

So we have seen how the low-value cash transaction market represents an opportunity for card issuers using contactless cards, but contactless payment also offers other forms of revenue generation.

Given product risk management considerations, contactless payment is mainly targeting low-value payments. For example, within the Euro zone the generalized limit for offline contactless payment (without PIN) is about €25. These limits are issuer-dependent and are connected to the issuer's business model. However, these limits allow issuers to penetrate the cash-dominated markets.

Such payment capabilities have been proven to increase the issuer's profitability by removing the cardholder's transaction limit, as is the case with cash in-hand payments. This will lead to an increase in consumer expenditure per card.

In addition, contactless functionalities introduce further opportunities for new business models. Indeed, contactless products deployed in others industries, like transport, will allow the creation of new alliances with third parties and ease business partnerships. For example, distributing devices that act as a payment tool combined with transport functionality will give issuers the opportunity to push their product portfolio to cardholders and thereby generate more business and revenues. Transport operators can then focus on their core business.

Overall, contactless functionality is a great way for issuers to offer differentiation and provide the market with new products based on debit, credit or pre-paid options, in addition to co-branding.

Such an approach can result in improved brand recognition, customer retention and improved customer segmentation - all of which are likely to increase revenues.

2.1.3. Contactless security

Contactless payment cards rely on proven smart card technology, but smart cards are not just dumb memory-storage devices that allow a POS terminal to read data and perform a transaction (similar to a magnetic stripe card). Contactless smart cards can calculate unique values which change for each new transaction, while the terminal or authorization system is able to verify the value. Such values are computed based on cryptographic algorithms and keys, which are stored securely on the smart card. Moreover, by using EMV contactless smart cards, issuers benefit from the best and latest security standards with DDA or CDA.

Security is a fundamental building block to contactless devices and should not be a cause for concern for issuers or cardholders. Security features that protect against potential fraudulent contactless transactions are also present. Multiple security solutions are available to issuers, such as application deactivation or even special postal envelopes for added security when mailing payment cards to cardholders.

2.2. Thinking of the system

The industry needs to think of the entire contactless payments ecosystem, not just piecemeal solutions. It's clear that installing contactless terminals at the point of sale without full supporting marketing campaigns and wide-scale issuing, contactless cards will not be adopted by consumers. Issuing, acquiring and processing cards must be considered as one process when moving forward with contactless payment. The technology is well understood by the industry; products and services are available and contactless payment has proven to be successful in many ways, whether in small trials or country-wide roll-outs.

2.2.1. The issuer's point of view

As stated earlier in this paper, the three possibilities for an issuer to promote contactless functionality in their card portfolio are:

▸ Migrate a magnetic stripe program into a pure contactless card program, as in the US.

▸ Migrate an EMV contact program into a Dual interface EMV smart card program, as per successful experiences in the UK, Turkey, Canada and Korea.

▸ Migrate a magnetic strip program directly into a Dual interface EMV smart card program, as seen in localized experiments.

SPA members provide their knowledge, experience, products and services to help issuers take the next step in the world of contactless payment.

2.2.2. Personalization services

The personalization of a contactless card is provided as a service by SPA members. There is basically no difference to other EMV payment products. Techniques such as data generation or key management are very similar and are known to EMV technology providers.

Issuers with magnetic stripe card programs - or even contact-only EMV programs - who want to issue contactless cards can profit from the migration know-how of the payment industry and from services provided by SPA members.

Issuers with their own personalization lines need to upgrade their equipment accordingly, the payment schemes can provide all the necessary information.

2.2.3. The acquirer's point of view

The acquirer also has a central role, as acquirers can help motivate merchants and retailers to roll-out the contactless acceptance infrastructure. Crucially, the acquirer helps to ensure a comprehensive infrastructure for contactless payments. The technical impact for the IT systems at the acquirer level may be minimal, but this is beyond the scope of this white paper.
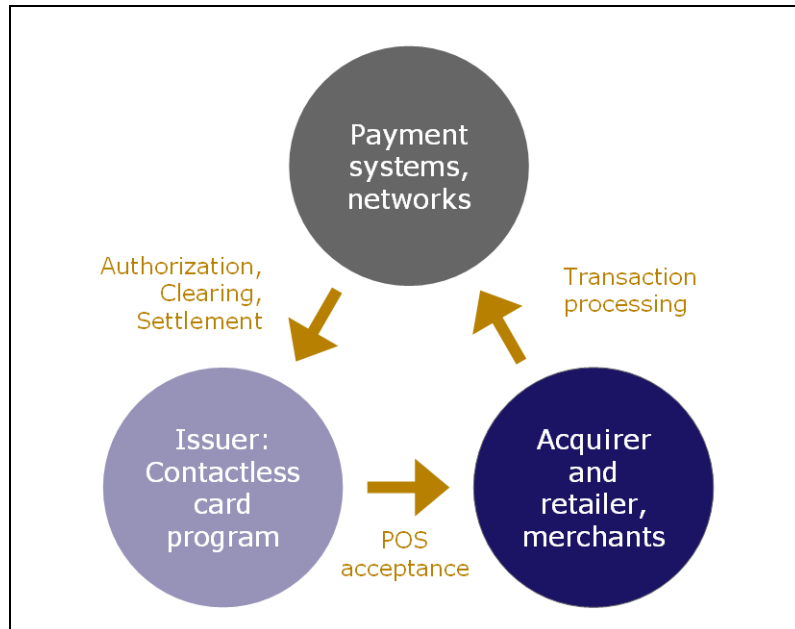

Fig. 2: System approach for contactless payment:
Issuance, acquiring, networks

2.2.4. Impact at the point of sale

At the point of sale, a contactless reader needs to be installed. It can be plugged into an existing POS terminal or cash register, and when introducing smart card technologies at the point of sale, like EMV, a contactless reader can be installed simultaneously. In some cases, the terminal or cash register software has to be modified too, so the acquirer then helps to formulate the optimal technical solution for merchant or retailer.

Many merchant segments have already begun accepting contactless card payments. It may not yet be used by premium car dealers or real estate agents, but perhaps bakeries, cinemas, pharmacies, public transport schemes, train station kiosks, taxis, quick service restaurants, gas stations, staff canteens and many other segments are destined to accept contactless card technology in the very near future.

2.3. The SPA approach

Contactless payment has already been a success story for issuers, merchants and retailers. SPA members provide a variety of products and solutions for contactless payment, paving the way for the latest mobile payment technologies.

2.3.1. Contactless payment on the rise

One important benchmark for gauging the success of contactless payment products is the number of contactless (and dual interface) payment cards sold. Although it represents 15% of all smart payment cards (more than 110 million cards in 2009), the percentage of cards with contactless technology is growing markedly. For dual interface products alone, the SPA's figures (published in May 2010) showed growth rates of 150% in 2009.

Another source, Eurosmart, expects growth rates of 25% for pure contactless and dual interface cards in the area of financial services, retail, and loyalty from 2009 to 2010. Additionally, the presence of more and more contactless terminals is important to the consumer, but the number of contactless transactions is growing. Recently, UK banks published statistics relating to the number of contactless transactions, confirming that contactless payment is in regular use at the point of sale. Still, there is a lot of room for improvement by all the parties involved.

2.3.2. An established technology

As previously mentioned, contactless technology is already well accepted in many other segments, such as building entry and mass transit. Using contactless cards for payments is the natural next step.

The SPA's members offer a broad range of contactless and dual interface products, including personalization services, consultancy and distribution. Today's card products are equipped with proven, reliable and discreet technologies. Based on well-known standards, all components of contactless cards are embedded within the smart card. Contactless smart cards are therefore very robust products.

2.3.3. Bring it to the consumer

Don't make the mistake of waiting for consumers to ask for contactless payment products. The SPA recommends issuers maintain an active role in offering new products and their associated benefits to customers. Clearly, issuers and retailers have to take the first steps.

Nevertheless, in order to influence the success of contactless payment adoption, SPA members - based on past experience - would like to recommend the following:

▸ By absorbing the surrounding marketing intelligence, consumers will realize the clear benefits of using contactless cards in their everyday lives: from buying sandwiches, newspapers, daily lunch and commuter tickets. Visible marketing campaigns (print advertisements, TV spots, etc.) educate cardholders and have positive effects for first deployments.

▸ Issuers need to consider the entire ecosystem, including the acceptance infrastructure. Agreements and common working groups with acquirers will be key to launching projects and gaining cardholder acceptance. This ensures that contactless cards will used by consumers every day.

▸ For merchants, staff training is a major marketing tactic to ensure mass adoption of contactless payment. If well informed, the merchant is a powerful communication channel for promoting contactless technology to cardholders

3. Contactless payment new form factors

Contactless payment encourages a shift away from well-known payment card form factors. The usual magnetic stripe or EMV smart card requires strong compliance with standardized physical dimensions simply to ensure global interoperability from the physical point of view. Cards need to be swiped or slot inserted and this requires unique physical dimensions.

Contactless technology is different. The only important thing is to ensure data transmission over a few centimeters between the POS contactless reader and the contactless card itself. Even if the card is smaller than a regular card it is not a problem as long as the reading distance is acceptable.

To this, the most popular contactless form factor is the sticker: a reduced card size which attaches to the rear of a mobile phone. Needless to say it can be stuck to other surfaces too, but as most people carry their mobile phone with them at all times, it is the natural choice to attach a contactless payment sticker.

3.1. Passive and active devices

SPA members provide different innovative form factors for contactless payment. Depending on the volume even customer specific designs and shapes are possible. Form factors are an alternative to turning non-NFC handsets into contactless devices. They help to speed-up mass deployment as the convenience of using their existing phone makes them attractive to most consumers.

Fig. 3: Contactless mobile sticker

The idea is to use existing contactless and dual interface products and transpose them into a new shape. In this case, the new form factor is still a passive device. More elaborate form factors equipped with external power sources can be found, known as 'active' devices.

3.1.1. Passive form factors

Simplified, passive form factors are re-sized and re-shaped contactless payment products. The most common ones are the following:

▸ Passive stickers. Derived from a regular contactless payment card, this form factor is a contactless sticker which can be stuck onto any surface, preferably a mobile phone. It often consists of the same secure payment smart card and therefore behaves identically.

▸ Key fobs. The same idea is applied to this form factor, which is shaped like a key fob. There might be a thicker housing, whether plastic or even leather and can be attached to a keyring.

▶ Other contactless functionalities can be provided with other form factors (such as wrist watches). Using watches for contactless access is a common practice, so using them for payment is the next logical step.

All passive contactless payment form factors operate without the need for a fixed power source.

3.1.2. Active form factors

Compared to passive form factors, active devices can communicate with a handset. Given that additional software is loaded on the mobile phone, one can use the keyboard and display of the mobile phone to interact with the user, or use OTA for remote personalization.

▶ Active Sticker: This is a powered stand-alone device. The active sticker contains the entire payment device, including an antenna and battery. Optionally, the active sticker can have additional capabilities which allow it to communicate with mobile phones using Bluetooth (for example).

▶ Active tag is similar to the active sticker, however the form factor is optimized to carry it as a keyring attachment (or similar). Unlike key fobs, active tags can communicate with a mobile phone.

▶ Contactless Secure Memory Card is a memory card, usually in the SD or microSD form factor, powered by the mobile device. In addition to the on-board mass storage, it carries a smart card for payment applications. Such form factors can easily be inserted into mobile phones. Some variants even come with an integrated antenna. Having an integrated antenna means that any phone with an appropriate memory card slot can be turned into a contactless payment device.

3.2. Benefits

New form factors for contactless payment help issuers to provide unique products to their cardholders. Contactless stickers seem to be the most interesting new form factor; passive stickers are essentially a pure contactless card, and are therefore very easy to integrate into an existing contactless card issuing strategy. Forward-thinking issuers know that their consumers can only attach one sticker to their mobile phones, so stickers are an important step in introducing mobile phones as a payment device.

Active form factors offer more possibilities as they can directly interact with the mobile phone. This brings new possibilities for branding, for example - using the device's screen to communicate new offers to the consumer. The contactless payment function can be enriched with additional applications.

3.3. The SPA approach

Contactless payment is a reality – SPA members are aiming to support issuers willing to move forward to the latest mobile payment technologies. Indeed, the limited number of NFC mobile handsets and the higher level of complexity required for NFC mobile payment deployment have opened the door to innovative payment devices, partly thanks to the use of new form factors.

Wherever form factors are deployed as either normal means of payment, companion cards or the first step toward NFC payment, new innovative form factors will not replace but enhance contactless smart card programs and NFC solutions.

3.3.1. NFC payment on the rise

Today, an increasing number of mobile network operators are becoming active members of the NFC ecosystem. There is no doubt that in the near feature more and more individuals will demand mobile payment as a daily payment tool. Issuers and mobile operators will have to find a way to provide markets with a standardized offering.

In the meantime, thanks to new and innovative form factors, SPA members already provide issuers and/or mobile operators with the solutions to provide a first step deployment. The company that is first-to-market for mobile payments will be the first to gain a significant competitive advantage and clear brand positioning compared to those who wait for the availability of the NFC ecosystem.

The SPA's members help issue contactless and dual interface card programs, which are not only a product, but the foundations of the next step: mobile payment NFC.

3.3.2. Get your customer ready

Contactless form factors attached to mobile phones will help develop the contactless infrastructure - training and educating end users in the ways of NFC payment behaviors, providing an efficient and scalable way of setting up the overall NFC ecosystem. It bears repeating that for contactless payment to be successful, it is vital not only to roll out the technology but to train and educate consumers, merchants and staff at the cash registers. Issuers and acquirers play a very important role in supporting and delivering this message.

4. NFC mobile payment solutions

The mobile phone is at the heart of everyone's day-to-day life. Most of us like having the latest handsets with plenty of useful features and the most cutting-edge technology. Our phone is always with us; it is regarded as a very personal device that provides access to private contact directories, personal images, email accounts, internet access and even online banking.

With the mobile phone's central role in modern life, it makes sense to use it as a way of making contactless payments. NFC embedded into a mobile phone transforms this from being a distant dream to an exciting reality.

Mobile NFC technology primarily emulates a contactless card, and is then labeled as mobile NFC payment. It is beyond the remit of this document, but exciting opportunities lie ahead for consumers as mobile NFC could become a contactless POS terminal for mobile merchants, or be used for exchanging information between two NFC handsets and thus allowing person-to-person payments.

4.1. Benefits – one step ahead

Mobile NFC phones bring a new dimension to contactless payment by offering interactivity through the handset screen, connectivity via the over-the-air channel and multi-services capability.

For consumers or mobile cardholders, the handset screen allows the latest transactions to be viewed, or to check balances. Furthermore, it brings the opportunity to input information, such as the amount to be topped-up for pre-paid accounts, or mobile PIN entry to secure access to certain sensitive information - a personal account number, or to simply authorize a payment. This last feature is key, as it gives the consumer the capability to "control" his or her own payment instrument and customize it as per their own security preferences. Studies have shown that the mobile phone is always carried with its owner, making detection of loss or theft more immediate compared to the traditional payment card. Mobile NFC payment therefore becomes the ideal instrument for a transition to the cashless society.

For issuers, the full integrated NFC solution has many advantages since the phone's display and keyboard can be used to complement the contactless payment application. The display, for example, allows the issuer to present their logo when performing a payment transaction. The keyboard can be used to enter a mobile PIN, allowing low-value and high-value payment transactions and bringing further flexibility to contactless payment compared to traditional cards.

Over-the-air communication channels enhance the current provisioning mechanism by offering payment instrument administration. This allows remote subscription, issuer script processing or offline counter resets and much more. Most importantly, the mobile contactless payment service becomes the first of a myriad of additional services that the issuer can offer as part of a mobile wallet proposition (mobile OTP, money transfer, mobile marketing, mobile banking, etc.) This clearly deepens the issuer's relationship to their existing customers, which in turn attracts new customers thanks to the added benefits and conveniences of mobile payments.

4.2. Businesses at the crossroads

According to multiple sources, mobile phones have one of the highest penetration rates of any modern technology. Furthermore, the NFC ecosystem is addressing multiple players such as mobile operators, banks, financial institutions, transport authorities and retail groups, all of which could benefit from new revenue streams thanks to NFC mobile payments. Mobile operators play a central role within the NFC ecosystem, where any business generating application would be securely stored on the SIM card. For banks and financial institutions, retaining the position of top branded payment solution is their key objective. For transport authorities, cost improvements and commuters' experience improvements are key drivers that NFC could accommodate. For retailers, rewards for loyal customers would strengthen trustworthy behavior and generate increased usage through product adoption.

Involvement in this new payment evolution is vital if issuers are to maintain their market positions. Attracting customers with the proper value propositions will generate competitive advantages early in the NFC ecosystem lifecycle. Given the complexity of this ecosystem, it is too early to have a clear view of each entity's roles (and it is not the SPA's place to speculate). Nevertheless, support functions will be required (such as network services) and this could reshape the existing business landscape.

Although this SPA white paper does not aim to provide definitive business cases, it is obvious that multiple industry segments could benefit from mobile payments. SPA members see clear synergies between transport, low and high value payments, online content payments, person-to-person payment and much more.

4.3. Mobile NFC devices demand new security concepts

It is expected that handset vendors will provide a broader range of NFC-compatible models in the near future, with mobiles being equipped with a contactless antenna and a secure element. Mobile payment NFC is like a contactless banking card integrated into the mobile phone: security standards for banking smart cards are of a very high standard. Consequently, equivalent standards or higher must be provided by mobile handsets if they are to be employed for NFC mobile payment.

Technically, a Secure Element (SE) is a dedicated hardware element in the mobile handset. It can be embedded as an SE chip, or found within a SIM or UICC card, which already contain a secure smart card.

Alternative solutions are to employ an external attachment to the mobile phone. Existing phones without NFC support can be converted into NFC devices by any kind of NFC attachment which has both a contactless antenna and a SE incorporated. Several other NFC options are available, for example SIM cards with an additional antenna attachment in the phone. These methods help achieve a faster NFC deployment and bridge the gap until full-featured NFC phones are available.

An in-depth description of all possible variations has been published in the Mobey Forum white paper [MM 2010], among others.

4.4. Deployment models and TSM

Payment cards are usually personalized in a batch mode using contact or contactless interfaces, and while such legacy distribution models may continue to exist, it is likely that OTA connectivity of

mobile phones will broaden since it allows remote and instantaneous service subscriptions and deliveries. This trend is illustrated justified by the following points:

▸ Mobile NFC payment services generally comprise several components, notably a cardlet running in the secure element and a graphical user application running in the handset. Both must be provisioned seamlessly for the end-user.

▸ The OTA channel will be implemented for administrative cases, such as mobile PIN unblocking, temporary application locking or offline counter reset processing.

To ease OTA activities in such a multi-stakeholder environment, a new role has been defined: the Trusted Service Manager (TSM). The primary role of the TSM is to manage the delivery and life-cycle of mobile contactless applications, and to ensure global coherency of service delivery. For mobile NFC payment services, the TSM has to follow the strict security and confidentiality requirements inherited from banking card personalization security, plus the updated specific mobile gateway security needs.

The secondary role of the TSM is to provide a single point of contact for issuers to access the large consumer bases of the various existing mobile networks and handsets. The TSM also greatly simplifies the support of additional services, in readiness for when the issuer expands its mobile wallet offer.
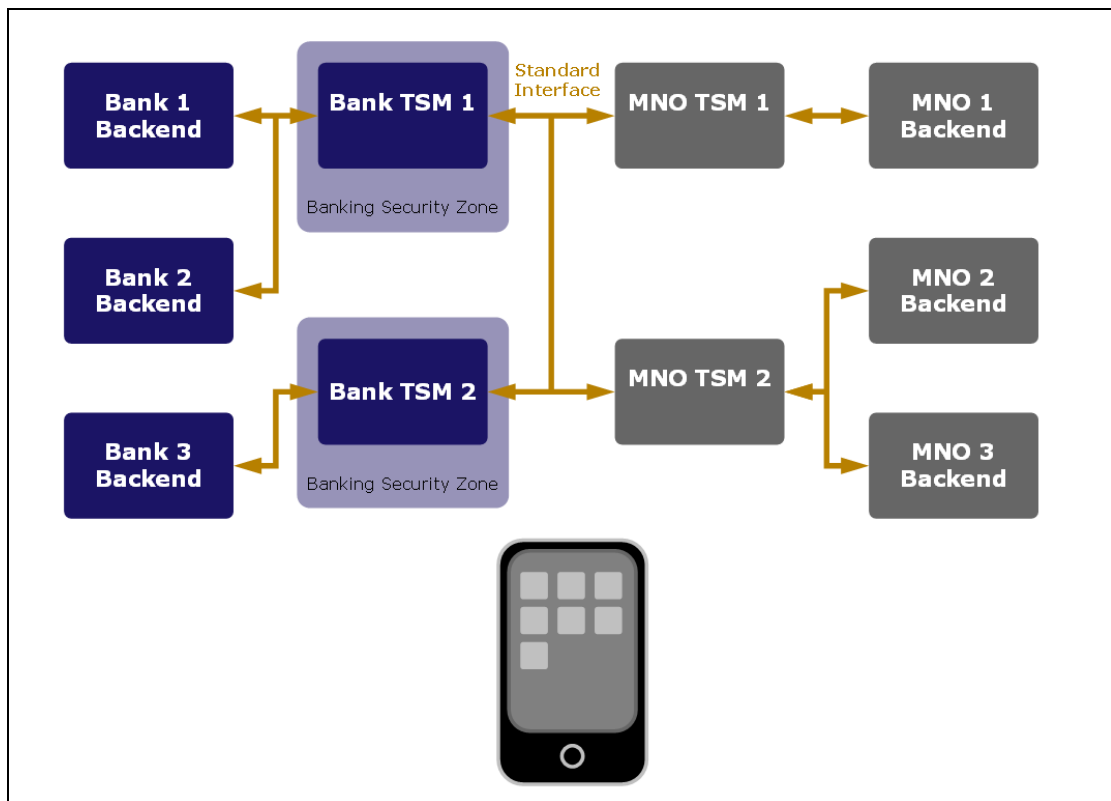

Fig. 4: TSMs interfacing with banks and MNOs to deliver services for mobile devices

The TSM role is now fully endorsed by multiple NFC ecosystem players. From an architecture perspective, it can be segregated into two distinct roles - bank TSM and MNO TSM – both of which communicate through standardized interfaces. The bank TSM captains NFC contactless payment service provisioning and post-issuance management, and is independent of the secure element. The MNO TSM takes charge of handset and secure element life cycle management (handset loss, replacement, etc.) and is independent of the mobile contactless payment services.

This architecture allows for clear technical and commercial segregation between stakeholders, and facilitates the deployment of mobile contactless payment projects, regardless of the business model established between given parties. In certain cases, this architecture allows for alternative personalization channels by routing the service-provisioning data over the internet to the bank branch. This would, for example, allow instant issuance over the contactless interface.

4.5. Impact at the point of sales

NFC-based mobile payment is usually implemented in a manner that lets a mobile phone behave like a contactless smart card. This allows the point-of-sale terminal to process the contactless payment transaction identically to any contactless smart payment card. This means that the existing POS contactless payment infrastructure can be fully utilized without needing to be adapted. This is one of the reasons why the SPA is urging issuers to define their contactless card strategy at an early stage, since a broad contactless acceptance infrastructure is an important milestone for the success of contactless payment.

The goal of many payment schemes is to achieve global interoperability and acceptance, defining and maintaining systems globally with minimal changes to the infrastructure. When new functions are introduced, compatibility with existing systems is crucial for success.

4.6. The SPA approach

It would be incorrect to claim that mobile contactless payment implementation is as straightforward as contactless smart card deployment. Nevertheless, the collaborative efforts of industry players, together with innovative bank issuers, mobile network operators, card schemes and standardization bodies, have led to considerable progress. Most notably, progress has been made in the area of new mobile contactless payment specifications, standardization of SIM-based implementations and the simplification of the roles of service providers and MNO TSMs. With the standardization of various interfaces, the technical risks are now mostly under control.

NFC mobile payment is fast becoming the next logical step for contactless migration. It is in the hands of the issuers to deliver the marketing message to their customers and promote their own differentiated brand and image.

To make things happen, the various stakeholders - and in particular issuers and mobile network operators - need to make solid business agreements with each other. These two different industries will have to rework their traditional business models and answer significant questions: who controls the transaction flows? Who deploys NFC compatible handsets? How are revenues to be shared?

5. Future outlook and trends

Mobile payment is the current hot topic in the payment industry, being rich in variation in terms of business opportunities and technology. The secure NFC platform is an appealing proposition for other applications too, like mobile banking and transport. A high level of security is essential, as open mobile platforms are attractive targets for hackers, viruses and fraudsters.

NFC mobile payment is a chance for everyone to enter into new areas of business and generate additional revenue streams. New regulation and legislation will ease new players to setup their own payment schemes, a trend proven by several (non NFC-based) remote payment schemes. Ignoring these trends might not be the best option.

Finally, many Asian countries have already established a successful environment for mobile phone-based contactless transactions. It proves that this technology can be the foundation for very profitable businesses that reach a broad spectrum of consumers.

Secure mobile devices are on the horizon, and consumers will quickly adopt such attractive applications. The industry is tasked with providing evolving technologies and developing its business models accordingly. If all stakeholders understand the steps required to reach this target, new opportunities are there to be seized that will ultimately benefit everyone, from issuers and MNOs to consumers and merchants.

In the second half of 2010 rumors are afloat that major handset vendors will introduce several new NFC-enabled phone models in the near future. Based on well-established contactless payment smart card programs, fast deployment of NFC mobile payment is possible. In the future, we can expect to see the introduction of person-to-person payments and mobile NFC acceptance devices – all with the aim of addressing additional new business opportunities.

6. Addendum

6.1. Smart Payment Association – a brief portrait

The Smart Payment Association (SPA) is dedicated to promoting and facilitating the use of smart cards for payment. A non-profit organization founded in 2004, the SPA now has six members including Austria Card, Incard and Morpho, in addition to the three founding members: Giesecke & Devrient, Gemalto and Oberthur Technologies.

With more than 675 million payment smart cards delivered by its members in 2009, the SPA represents around 86% of the smart payment cards market.

The association's role is not limited to education and promotion. The SPA shows its technical and commercial teeth through its comprehensive program of industry working-groups that seek to accelerate the transition from traditional magnetic stripe cards to chip-based cards. Furthermore, the SPA is working to advance interoperability and security between all system components, and looking into any form of payment that is both individual and secure.

SPA acts as the Spokesperson for the Vendors Sector in the EPC-CSG, whose objective is to create a set of standards needed to implement SEPA for cards. SPA is an Associate Member of Eurosmart and a Technical Associate of EMVCo.

Please visit SPA at http://www.smartpaymentassociation.com

6.2. Abbreviations and glossary

CDA – Combined DDA and application cryptogram generation ▶ Similar to DDA (see below) combined with other EMV transaction steps in one single step.

Chip card ▶ Payment card with chip technology. Better known as →smart card

Contactless ▶ Contactless in the context of this white paper: card-based payment transaction by exchanging payment data between card and POS terminal over the air, i.e. without physical contact between card and POS terminal. All data and even the power for the card is transmitted over the air.

DDA – Dynamic Data Authentication ▶ DDA is a offline card authentication method to verify whether a card is genuine or not. It is based on public key cryptography. Defined by EMVCo, it is used in many EMV cards. Many more interesting details can be found in SPA's white paper "Strengthening Card Authentication – A Migration to DDA", January 2010 [SPA2010].

Dual Interface ▶ A dual interface card provides two interfaces for data exchange. Firstly, a contact interface and secondly an antenna for contactless operation. Both interfaces are connected to the same single integrated smart card chip (embedded in the card), allowing applications to be accessed via contact or contactless interfaces.

Ecosystem ▶ In this context: NFC ecosystem. NFC mobile payment requires many players and stakeholders. Each of them follows their own interests, requirements and business cases. As this a complex environment, the term NFC ecosystem was invented to describe this situation.

Embedded SE ▶ A Secure Element (SE) which is completely embedded into the mobile phone. Being a microchip based on smart card chip technology, it is soldered onto the phone's printed circuit board.

EMV – Europay MasterCard Visa ▶ Global standard for smart card-based payment transactions, maintained by EMVCo, which is owned by the payment schemes MasterCard, Visa, American Express and JCB.

FI ▶ Financial institution

Form factors ▶ Contactless payment cards are not restricted to the size of regular plastic card dimensions. Virtually any form and shape can be used, provided that certain contactless performance requirements are fulfilled. All such variants can be summarized by using the term 'form factor'. Some typical form factors are key fobs, stickers and wrist watches.

Hybrid card ▶ A hybrid card is a card consisting of two smart card chips. One communicates through the contact interface, the other through a contactless interface. Both chips are not interconnected.

Issuer ▶ Any mobile NFC payment product, which is a service or application, will be provided by an issuer to the consumer. The issuer for payment products is typically a bank or financial institution. MNOs or system provider can also act as issuer.

Key fob ▶ In this white paper, a contactless payment device is meant, consisting of a smart card chip including an antenna. The form is similar to that of any other key fob.

NFC - Near Field Communication
NFC is a wireless data transmission technology for short range communication, defined by ISO 18092, based on ISO 14443 communication standards for contactless cards.

microSD card ▶ The microSD (Micro Secure Digital) card is a very small form factor. MicroSD slots can be found in many mobile phones. Although it is a very small device, secure microSD cards can have an additional →Secure Element and even a contactless antenna. Such cards can be used for mobile payment.

MNO – Mobile Network Operator ▶ MNOs provide and operate mobile networks. Mobile phone users are their customers. MNOs also take care of the distribution of phone models.

Mobile banking ▶ Using the mobile phone as device to perform banking-related transactions and account management functions.

Mobile payment ▶ Using mobile phones as devices to perform payment transactions. If based on NFC, the phone can be used in a similar way to a contactless card at the point of sale.

OTA – Over the Air ▶ In this case: Provisioning of payment software and personalization data being delivered to a secure mobile phone. All data are transmitted encrypted, which ensures that only the eligible card holder gets his or her personal data loaded onto the phone.

POS – Point of Sale ▶ Merchants and retailer use POS terminals for their card transactions. For contactless payments, it must be equipped with a contactless reader.

Pure Contactless Card ▶ Card with a contactless chip and an antenna hidden in the card body. Those types of cards are used only in contactless mode.

Remote payment ▶ In contrast to →mobile payment, remote payment does not use NFC. Instead, remote payment transfers money using SMS or other means.

RFID - Radio-Frequency IDentification ▶ Usually used for simple identification means. RFID can be regarded as a successor of barcode technology to identify and tag goods.

SE – Secure Element ▶ A Secure Element is a dedicated hardware chip, usually a smart card chip, which is integrated into a mobile device. The SE is capable of storing secure applications (like payment applications), including all cryptographic keys and personalization data.

Secure Memory Card ▶ Memory card with mass storage and an additional → SE Secure Element. A secure memory card is an alternative to retrofit mobile phones with additional security, especially for mobile payment applications.

SIM – Subscriber Identity Module ▶ The SIM card is a smart card for mobile phones, and the key element of the →MNOs ability to identify the mobile phone user and link the user to their contract and account. In the future, the SIM card might be enhanced with NFC functionalities, whereby the SIM card becomes a →secure element.

Smart card ▶ A smart card is equipped with an additional high-security semiconductor chip. This chip contains an operating system, cryptographic keys and one or more applications, like payment. The chip has multiple security devices to protect against attackers and fraudsters.

SPA - Smart Payment Association ▶ The previous chapter provides an overview of the Smart Payment Association.

Sticker ▶ In this context: A →form factor of a contactless card, predominantly to be glued to the reverse side of a mobile phone. More sophisticated stickers, so-called active stickers, are equipped with further electronic components and support additional communication interfaces.

SWP – Single Wire Protocol ▶ A new protocol of mobile phones to allow NFC SIM or UICC cards to access the contactless antenna of the mobile device.

TSM – Trusted Service Manager ▶ Takes care of administrative functions when banks and MNOs are rolling out mobile payment services. For mobile payment, TSMs load applications, keys and personalization data to mobile phones and administer them through the life-time of the device.

UICC – Universal Integrated Circuit Card ▶ A generic and well standardized physical and logic platform for Smart Card Applications. The UICC is issued by one party who will usually include at least one Application on the card. UICC cards have been used typically by Mobile Network Operators (MNOs) who have included a USIM (UMTS/3G SIM) Application on the Card to authenticate the user in a 3G network.

6.3. References

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