

NFC mobile payment

by the Financial Infrastructure Department

A NEW MARKET

When Hong Kong Monetary Authority first raised the subject of Near Field Communication (NFC) mobile payment in the third quarter of 2012, not many people in Hong Kong knew about NFC. A little over a year later, there are now six payment service providers¹ offering or set to offer NFC mobile payment services, as well as four mobile network operators (MNO) and two card schemes which have teamed up to enter into NFC business. The completion of an HKMA consultancy study in early 2013 and the promulgation by the Hong Kong Association of Banks (HKAB) of common standards and guidelines for NFC mobile payments on 25 November 2013 were both timely measures that helped facilitate the market's development. This set of common standards and guidelines can be a catalyst for the development of NFC payment infrastructure in Hong Kong. Compared with other financial centres, Hong Kong is one of the most vibrant and fastest growing markets in NFC mobile payment products and services. This leading position has been achieved through the efforts of the HKMA, HKAB, payment service providers and other relevant service vendors.

Introduction

The proliferation of smartphones and the advancement of NFC technology have offered considerable opportunities for payment service providers to enhance users' payment experience and provide value-added services in addition to basic payment service. This report describes the development strategy adopted by the HKMA, and provides an analysis of Hong Kong's NFC mobile payment market.

A market ripe for NFC mobile payment

A global analysis of cashless transactions indicates that Hong Kong is one of the most successful economies in promoting the use of electronic money, and is therefore well positioned to advance to the new era by developing NFC mobile payment. Data from local sources show that 85% of non-cash transactions, by number, are already contactless.² This, coupled with a high smartphone penetration rate and increasing availability of NFC-enabled

¹ Payment service providers refer to the issuers of mobile payment services. They include banks, prepaid card operators and even non-bank institutions.

² The data is derived from the following sources:
 Hong Kong Interbank Clearing Limited (HKICL) Statistics of Clearing Transaction Volume:
<http://www.hkicl.com.hk/clientbrowse.do?folderID=269&lang=en>
 Octopus company profile:
http://www.octopus.com.hk/web09_include/_document/en/company_profile.pdf
 HKMA Payment card statistics:
<http://www.hkma.gov.hk/eng/key-information/press-releases/2012/20120315-3.shtml>

handsets, provides all the necessary ingredients for Hong Kong to become one of the busiest NFC mobile payment markets in the world.

While NFC mobile payment is becoming the next trend in retail payment, it is crucial for all stakeholders such as payment service providers, MNOs, handset manufacturers and trusted service manager (TSM) suppliers³ to take concerted efforts to ensure healthy and sustainable growth of this new service. It is therefore the perfect time to conduct a study and devise a roadmap to facilitate the development of NFC mobile payment in Hong Kong.

Development strategy adopted by the HKMA

Consultancy study

The HKMA appointed a consultant in July 2012 to conduct a study to analyse the development of NFC mobile payment services in Hong Kong. The objective of the study was to establish an effective NFC mobile payment infrastructure that would allow interoperability among different payment services and achieve four development objectives:

- (i) ability to download available payment services from different payment service providers onto a single NFC-enabled phone;
- (ii) payment services continuity despite switching from one mobile network operator to another;
- (iii) payment services continuity despite changing one's NFC-enabled phone; and
- (iv) high level of security in line with international standards and relevant regulatory requirements.

The study analysed the global trends of NFC mobile payment development, considered the experience and lessons learnt from those economies which have implemented pilots or commercial launches, gauged market feedback and analysed the attributes that are unique to Hong Kong before making recommendations on the strategic direction. It reaffirmed Hong Kong's promising market conditions for the rapid take off of NFC mobile payment services with its strong consumer acceptance of contactless payments, high smartphone penetration and increasing availability of NFC-enabled phones. It also made two recommendations for achieving these objectives: (i) development of a set of common standards and guidelines for the industry players to follow; and (ii) adoption of a market-driven approach on the development of NFC mobile payment infrastructures.

Development of a set of common standards and guidelines

Based on the international best practices, the consultancy study recommended that Hong Kong should implement a set of common standards and guidelines covering the following three aspects:

- (i) security requirements to ensure the security of services;
- (ii) technical standards to facilitate interoperability among different NFC infrastructures, mobile devices and terminals by adopting widely applied industry and international standards; and
- (iii) operational process to enhance user experience by introducing standardised operational process.

³ In general, a trusted service manager refers to a trusted system responsible for the secured distribution, provision and management of the life cycle of NFC applications to the customers of mobile network operators on behalf of payment service providers.

In light of the recommendation of the consultancy study and with the support of the HKMA, an industry task force, comprising the HKMA and retail banks, was formed under HKAB in March 2013 to discuss and finalise the above documents. After rigorous review and discussion by the task force members, the HKAB issued on 25 November 2013 the Best Practice for NFC Mobile Payment in Hong Kong (Best Practice) which contains a set of common standards and guidelines. The Best Practice paves the way for the development of NFC mobile payment as depicted in Figure 1. The HKMA will take into account the security requirements set out in the Best Practice in its supervision of NFC mobile payment services offered by authorized institutions.

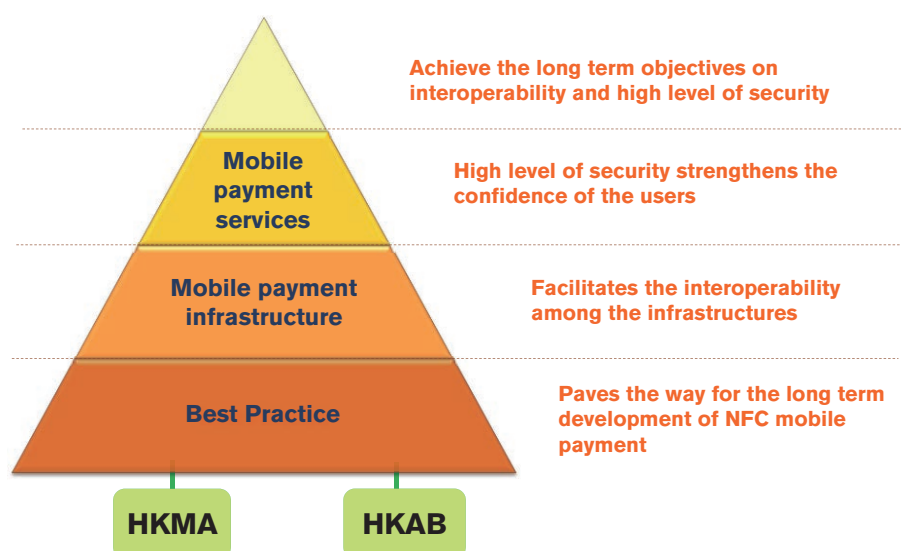
Development of a shared NFC mobile payment infrastructure

The development of a shared NFC mobile payment infrastructure can be achieved by either a market-driven approach or a government-led approach. For

instance, France has adopted a market-driven approach whereby some banks and MNOs have jointly implemented a shared NFC infrastructure. In contrast, the Singaporean government has taken the lead to establish a common NFC infrastructure which is open to all interested parties and requires all participants to follow the same standard. As both approaches are effective in achieving interoperability, the choice would depend largely on the market dynamics of the individual economy. In general, a market-driven approach for shared infrastructure development speeds up launches of NFC service and is more receptive to stakeholders. Thus, it should be adopted if the stakeholders are willing to collaborate and develop a shared NFC infrastructure. Since a card association has announced its plan to develop a shared and open NFC infrastructure for its member banks as well as other payment service providers, the HKMA supports a market-driven approach and will continue to monitor the market situation closely.

FIGURE 1

Best Practice serves as a foundation for the development of NFC mobile payment



NFC mobile payment market in Hong Kong

Innovative solutions with different types of NFC devices

Hong Kong's NFC mobile payment market has been vibrant and innovative since early this year. Payment service providers have implemented NFC mobile payment services with different types of NFC devices. They include SIM card, micro-SD, phone sleeve and even external device which can be plugged in to the audio jack of a smartphone. Each type of device has its own product features, device costs and distribution channels as summarised in Figure 2.

No “one size fits all”

The innovative devices offered by the service providers give customers a wide range of choices. Generally, customers have different preferences on mobile phones, MNOs and payment cards. They may even have preference on the look and feel of the NFC devices. Offering different innovative NFC devices can increase the attractiveness of the services to customers. This is particularly important in the early stage of a new product where the mainstream customer behaviour has not yet evolved. In addition, the continuous advancement in technology may give birth to new solutions. For instance, the latest discussion is to apply IT cloud technology to stored payment card information in cloud servers (also known as Host-Card-Emulation approach). Thus, it would be immature to limit the market to one particular type of NFC device.

From payment service providers' point of view, the choice of different NFC devices allows them to implement different business strategies based on their commercial relationships with other market players. For example, some providers go for a SIM-based approach in partnership with MNOs to leverage on their wide customer base and strong knowledge of mobile technologies. On the other hand, some providers prefer micro-SD or iPhone sleeve approach, skipping the MNOs, in order to deploy the service in a shorter time frame. Market players believe the entry barrier to launch NFC mobile payment service is high due to the high investment cost, small addressable market size and complex ecosystem. Flexibility on the choice of devices helps them to derive a business plan which fits their goals. This is evidenced by the growth in payment service providers from two to six in 2013.

Expand the size of target customer group

A hindrance to the popularity of NFC mobile payment service is the limited number of customers with NFC-enabled phones. To overcome this hurdle, some payment service providers launched phone-independent NFC devices such as iPhone sleeve and audio jack device which allow customers to use the service without having NFC-enabled mobile phones. This significantly expands the target customer group to cover a new market segment which would have otherwise been excluded from using NFC mobile payment services.

FIGURE 2

Comparison of different NFC devices

NFC device	SIM card	Micro-SD	Phone sleeve	Audio jack device
Device ownership	MNO	Bank	Bank	Bank
Handle multiple payment cards	Yes	Yes	Yes	Yes
Require an NFC-enabled phone	Yes	Yes	No	No
Collaboration with MNO	Yes	No	No	No
Impact on MNO change	Change SIM	Nil	Nil	Nil
Impact on mobile phone change	Nil	Nil	Change sleeve	Nil
Device cost	Low	Medium	High	High

Interoperability is the name of the game for success

Interoperability can be measured in two ways. From the payment service provider's viewpoint, it is achieved by storing its payment cards into a wide range of customers' mobile phones, regardless of their NFC device types. To manage different types of NFC devices effectively, infrastructure suppliers, service providers and device vendors in the ecosystem have to follow a common set of technical standards as specified in the Best Practice. The shared infrastructure under development by a card association is a good example of supporting NFC devices from different payment service providers.

From the customer's viewpoint, interoperability means carrying multiple payment cards from different providers in a single mobile phone. This can be facilitated in two ways. First, multiple payment cards can be stored in a single NFC device. More precisely, payment cards are stored in a secure element (SE) which resides in every NFC device. This secure element is capable of dividing its space into partitions to hold cards from different providers. SIM card is a typical NFC device to support multiple providers as it is owned by an MNO which earns income from renting the partitions to providers. For the other NFC devices which are likely owned by banks, it will depend on the banks' willingness to share the space with other parties. A shared NFC infrastructure is very often in place to serve as a hub to effectively manage the connections between providers and secure elements.

Alternatively, different NFC devices can be embodied in one mobile phone. This is particularly the case for phone-independent NFC devices such as SIM card, micro-SD and audio jack device. The model is depicted in Figure 3.

Figure 3

Interoperability model with multiple payment service providers connecting to multiple NFC devices



In both cases, the architecture and the specification of the secure element have to follow international standards adopted by the Best Practice. To avoid unauthorised third parties accessing payment card details, the Best Practice also contains security measures to control the access to each partition by the payment service provider which owns the partition. Other providers are not allowed to access other partitions' payment cards.

Are market players willing to cooperate?

The formation of an interoperable environment requires not only the existence of a common set of standards and guidelines but also the willingness of market players to connect to each other. From the economic point of view, it is in a payment service provider's interest to support as many NFC devices as possible to increase its potential customer pool. Similarly, it is in an NFC device issuer's interest to manage payment cards from different providers in order to maximise its return on investment in the device. For instance, a bank first launched its service in cooperation with only one MNO. It recently expanded the service by adding two MNOs. We expect this trend of expanding the coverage will continue in the future.

Future development

In parallel with the issuance of the Best Practice and the development of a shared NFC infrastructure, payment service providers and merchants have been working together on value-added services to maximise the benefits of mobile technology and enhance the end-user experience. The services include loyalty and couponing, advertising, transportation and ticketing, as well as physical access control. For NFC mobile payment service to succeed in the long run, it must generate value and benefits to different stakeholders. For customers, the service has to be convenient, simple and have a high level of security. For payment service providers, it has to provide a new revenue

stream and a sustainable business model. For merchants, it must be a cost effective channel to simplify the payment collection process.

Proactive role of the HKMA

The HKMA has taken a proactive role to facilitate the development of NFC mobile payment services. When the consultancy study started in July 2012, there was generally a lack of understanding of NFC mobile payment services among the stakeholders and no such service could be found in the market. Nonetheless, the study successfully aroused the market's interest and allowed the stakeholders to gain a deeper understanding of this subject. Since the commencement of the study, four banks and one prepaid card operator have launched the service and one bank has announced its plans to do so in the near future. The Best Practice published by the HKAB is timely as it provides clear guidance to payment service providers in developing the service. The key steps taken by the HKMA in driving the development of NFC mobile payment services are spelt out in Figure 4.

A healthy ecosystem is being built gradually by the joint efforts of the market players and the HKMA. With the favourable market conditions and a strong foundation in place, the market players may further develop the market through innovative services. Meanwhile, the HKMA will continue to monitor and support the development in Hong Kong.

Figure 4

The HKMA's roles in the development of NFC mobile payment in Hong Kong

