

Towards a Typology of Business Models for NFC–Based Mobile Payment Services

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INTRODUCTION

The last few years witnessed the steady proliferation of hand-held mobile devices, including mobile phones, iPhones, iPods and iPads. This trend was accompanied by the accelerated introduction of new mobile services ranging from basic voice and short messaging services to more advanced mobile internet, multimedia messaging and broadband mobile services, including mobile TV. At the same time, contactless card technology has reached a maturity stage with the successful adoption in the payment, retailing and transport sectors. As a result, the extension of mobile services to contactless services is perceived today as the next natural leap in mobile payment offerings.

Near Field Communication (NFC) is the enabling technology for this evolution. In fact, NFC has recently emerged as one of the most promising solutions for future contactless (mobile proximity) payment services and for other *ubiquitous* contactless applications. According to MacLeod, the number of NFC-enabled mobile phones sold is expected to raise at an 87% annual growth rate to reach around 300 million NFC handsets by 2016 (MacLeod, 2012; cited in Becker, Alper & Lee, 2014). Mobile NFC services make use of the synergetic blending of contactless card technology with mobile telephony, based on NFC technology. This blending creates exciting value-added business opportunities for contactless applications such as mobile payment, transport ticketing, physical access control, personalized/target advertising, loyalty services, hospitality, healthcare, and peer-to-peer data transfers, among many others. Much of the current interest in NFC technology is however directed towards contactless mobile payment (m-payment) applications, where the concept of mobile wallets (m-wallets) is gaining unprecedented popularity. In this chapter, we define NFC mobile payment as the use of an NFC-enabled mobile device to the close proximity of a point of sale (POS) reader in order to conduct a payment transaction.

Today, mobile NFC services in general, and NFC m-payment services in particular, offer a compelling business case, with a strong potential for additional revenue streams and marketing opportunities for the various members of NFC ecosystem. In fact, NFC is recognized today as the technology of choice for mobile payment services. The other competing technology is based on SMS text messaging, whereby the mobile subscriber sends a payment authorization request to the Mobile Network Operator (MNO) via SMS messaging. The MNO will charge the requested amount to the subscriber phone bill and the retailer will be informed of the payment success (Ozcan & Santos, 2010). SMS messaging was also used for mobile person-to-person (P2P) payment, but its usage for retail payments is constrained by inconvenience, lack of reliability and security, and delay-related performance issues (Crowe, et. al, 2010).

Yet, despite all the attention generated among practitioners, there is a lack of academic research on NFC ecosystem and the associated business models. This chapter aims to enhance our understanding of NFC mobile payment ecosystem by identifying and classifying NFC m-payment business models into a number of typologies.

DOI: 10.4018/978-1-4666-9787-4.ch007

The remaining of this chapter is organized as follows: Section 2 presents a brief overview of NFC technology and its services. Section 3 discusses a typology of mobile NFC services, based on a four-tier classification approach. This section also discusses the roles, interests, functions and interrelationships among the various members of the NFC m-payment ecosystem. Section 4 proposes a collaborative business model arrangement for the successful adoption and diffusion of NFC-based m-payment services. Section 5 outlines some recommendations for future research. Finally, section 6 concludes by providing a summary of the main findings of the chapter.

NFC: AN ENABLING TECHNOLOGY FOR INNOVATIVE MOBILE SERVICES

NFC is a short-range, standard-based wireless connectivity technology, designed to operate over very short distances, typically less than 4 cm for most practical applications, with a maximum theoretical range of 20 cm. NFC operates at the unlicensed RF ISM band of 13.56 MHz, and currently supports data rates of 106, 212, 424 and 848 kbits/second, with higher rates expected in future. The technology is compatible with existing contactless infrastructure and can be thought of as the fusion of RFID-enabled contactless smartcard and a mobile phone (Ondrus & Pigneur, 2007). This allows the mobile phone to act as a smart card reader. To establish a communication between two devices, using NFC, one device (the initiator) must be equipped with an NFC reader/writer, and the other device (the target) must have an NFC tag.

The integration of NFC into mobile handsets enables the mobile device to act as a mobile wallet that consists of three main components:

- **The Secure Element (SE):** The component in the mobile phone where the payment applications and customers' credentials are stored.
- **The User Interface (UI):** Allows the consumer to interact with the NFC applications and the secured data on the SE.
- **The RF Antenna:** Enables two-ways RF communication between readers and tags, using a standard air protocol.

Compared with other mobile-integrated short-range technologies such as Bluetooth, NFC consumes less energy, requires much shorter set-up time to auto-connect to a nearby NFC device, and operates over a shorter transmission range, which makes it inherently more immune to security attacks and RF interferences. The NFC Forum (2007) recognizes three primary uses of NFC, namely:

- Contactless transactions for the purpose of mobile payment, access and ticketing. In this case the NFC interface operates as an emulating smart card, with an external reader (the interrogator) reading the content of the NFC chip.
- Peer-to-peer (P2P) connectivity to exchange and transfer data between wireless components either directly through NFC (native connection) or by initializing a Bluetooth, Wi-Fi or WUSB connection between two mobile devices.
- Digital content access, such as using a mobile phone to read a "smart" poster equipped with an NFC tag. In this case, the NFC interface on the mobile device acts as a reader terminal.

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