

# Proposed NFC-based Micropayment Model and NFC-based Credit Card Model to Reinvigorate Traditional Markets

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**Abstract.** With advancement of mobile communication and information technology, mobile commerce (m-commerce) allows users to conduct business and service transactions over portable mobile phone. This trend is amplified by the Near Field Communication (NFC) and electronic cash payments technology. In this paper, we survey about the electronic cash payments and credit card system. And we propose the micropayment model and credit card model based on NFC in aspect of IT more than the physical infrastructure and environmental improvement projects to reinvigorate traditional market.

**Keywords:** NFC, Electronic cash payments, Credit card, Micro-payment

## 1. Introduction

With advancement of mobile communication and information technology, mobile commerce (m-commerce) allows users to conduct business and service transactions over portable mobile phone. This trend is amplified by the Near Field Communication (NFC) and electronic cash payments technology.

The regional distribution industry is mostly medium and small but plays a pivotal role in connecting production with consumption between producers and consumers around city. However, with a recent spread of large-sized sales facilities, the sales of small retail trade and traditional markets are on a decreasing trend. In order to solve this problem, diversified efforts have been made. A new approach from IT angles is necessary to reinvigorate traditional markets. In this sense, this study suggests the micropayment model and credit card model based on android NFC of smart phone as a new approach from IT to contribute to accelerated reinvigoration of traditional markets.

## 2. Related Work

### 2.1 NFC (Near Field Communication)

The concept of NFC (Near Field Communication) [1] [2] which grafts the existing non-contact card payment method using a HF range of 13.56MHz is to make authorization and payment when a mobile phone is close to a payment system.

Micropayment, Internet banking, and Internet shopping mall payment can be made via NFC rather than the SMS method. Automatic payment is possible when a mobile phone is contacted with the POS system in an automat or conveniences stores. NFC is low power and low cost communication solution to focus on personalized communication and allow all kinds of data to exchange in perfect safety environment by contacting user's devices. The NFC market can be divided into the communication field and the infotainment field. The communication field is used for near field communication for personalization or data communication for low power or low speed. In particular, it is very good to share low power data or exchange protocols for automatic execution of initial WI-FI or Bluetooth setup.

### 2.2 Survey of Electronic Cash Payments and Credit Card

This subsection investigates the processing flows of electronic cash payments (ECash, CAFE, NetCash, and CyberCoin) and credit card system (First Virtual, CARI, SSL, CyberCash, iKP, SEPP, SET). ECash is a computer generated Internet based system which allows funds to be transferred and items to be purchased by credit card, check or by money order, providing secure on-line transaction processing. Using cryptography, ECash was introduced by David Chaum as an anonymous electronic cash system. Ecash is used blind signatures to achieve unlinkability between drawings in and spend transactions [3]. Depending on the properties of the payment transactions, one distinguishes between on-line and off-line electronic cash. The first off-line e-cash system was proposed by Chaum and Naor [4]. CAFE (Conditional Access For Europe) has been a project in the European Community's ESPRIT program (Number 7023) that has developed a secure electronic payment system that protects the privacy of the user. Thirteen partners from several countries have been involved. The target was to make electronic wallets that can be used for payment, access to information services, and - if required - identification. It should be an open, secure system. The NetCheque® payment system is an electronic payment system for the Internet developed by Clifford Neuman and Ari Medvinsky at the Information Sciences Institute of the University of Southern California. At present the implementation is a research prototype and is available for licensing by companies implementing commercial payment service. It is not presently supported as consumer product or service. CyberCash, Inc. was an internet payment service for electronic commerce, headquartered in Reston, Virginia. It was founded in August 1994 by Daniel C. Lynch, William N. Melton, Steve Crocker, and Bruce G. Wilson. The company initially provided the electronic wallet software to consumers and provided software to merchants to accept credit card payments. Later they also offered "CyberCoin", a micropayment system modeled after the NetBill research project at Carnegie Mellon University, which they later licensed.

### 3. Design of Micropayment Model and Credit Card Model based on NFC

#### 3.1 Proposed NFC-based Micropayment Model

We proposed the proposed micropayment system model [5] in Figure 1. The difference is the NFC based account information of the proposed micropayment system model in Figure 1. Here, the 0 of Figure 1 in red color expressed the transaction of account information of Micro-payment using NFC P2P mode between NFC reader and NFC tag.

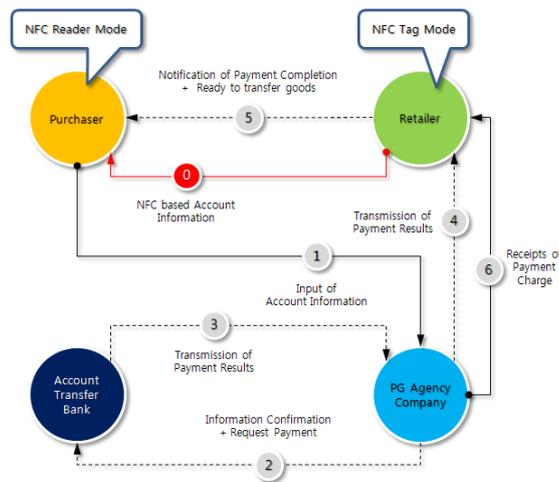


Fig. 1: Proposed micropayment system model based on NFC technique.

NFC scenario: a basic concept of Bluetooth pairing provided in the Android development site is used. The proximity device operation of NFC is favorable to the personalization of a mobile phone. In particular, personalization requires a smaller area in the operation range of wireless network, compared with WPAN. While WPAN is within 10 meters, NFC becomes WBAN (Wireless Body Area Network). It is necessary to search and select surrounding Bluetooth/WI-FI devices to operate Bluetooth/WI-FI first as an initial setup. The setup of Bluetooth/WI-FI needs to exchange Bluetooth/WI-FI address information. Then pairing is made. In the course of pairing, retailer's business information and account number is scanned and stored.

#### 3.2 Design of NFC-based Credit Card Model

The design of NFC-based credit card model is shown in Figure 2 which represents the flowchart of basic procedures for price payment. And the 0 of Figure 2 in red color expressed the transaction of account information of credit card using NFC P2P mode between NFC reader and NFC tag of mobile devices.



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