



Global Business Dialogue on Electronic Commerce

**GBDe 2006 Issue Group**

**“International Micropayment”**

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**1. Introduction**

With the rapid growth of the e-commerce market, the demand for micropayment is now rising rapidly. Due to the very nature of micropayment, namely small amounts in each payment and high frequency of transactions, the processing cost and efficiency become key success factors, especially for cross border transactions. In the past year, the credit card companies have started to consider handling micro transactions and, at the same time, e-wallet for micro prepayment is developing relatively fast. A micropayment method called Near Field Communication (NFC) mobile payment has been established in Asia. Nevertheless, for NFC or phone bill-based micropayment systems, set-up costs and high efficiency are still their common issues, particularly for extending transaction services across borders.

The set-up cost issue means that the incurred added fee can not be too much with respect to price of the merchandise. Here the added fee includes tax, agency fee of each service provider, cash transfer charge, and other added cost caused by cross border transaction including copyright license of content and withholding tax. Actually, the cost is always a relative, rather than absolute, amount for merchants or consumers. For instance, if the transaction is profitable and sale amount is huge then the merchants would not think the cost is too high even if the total cost takes up a rather high percentage of each transaction. Similarly, whether the transaction cost is high or not is closely associated with the perceived value and the demand of the consumers.

Generally, the transaction efficiency depends very much on overall transaction flow. As both the number of transaction nodes and connected systems increase, the transaction efficiency for international micropayment (IMP) becomes even more critical.

The current status of IMP in the world was investigated and summarized as below.

- Credit cards are still the most popular payment mechanism.
- There are still excessive payment tools, but their integration is not yet in the picture.
- The European payment landscape is heterogeneous. Money transfer and direct debit dominate in some countries.
- Similar situation is also true in Taiwan. Credit card payment is more popular for general transactions of tangible goods; however, it is not well trusted for transactions in the cyberspace.
- The prepaid and credit card based micro-payments still dominate in the United States.
- The growth of contactless card based payment is significant in Japan.
- Most payment types are still strictly regulated for domestic transaction.
- An integrated monthly phone bill as a payment mechanism is a favorable solution for digital content.
- For cross border transactions, a system integrating various micropayments of the same type is expected to run first.
- In addition to monthly phone bill solution, other micropayments should also be included as part of the integration issue.

## **2. Study Issues in IMP**

To further explore the important elements of IMP, some key issues such as market size of IMP, multiple system integration, ADR, taxation and legal issues are addressed in this report. At the same time, the GBDe has developed some policy recommendations for government and industry to help to create a better IMP environment. For the purposes of this investigation, we investigated the importance of a range of issues in the context of an IMP commercial trial run. The study issues include:

1. System integration
2. Taxation
3. Content and IPR
4. Settlement
5. Consumer dispute handling
6. Risk management.

## **3. Different payment approaches to IMP--Case study**

The payment models can be divided into two kinds according to their payment access method, namely, the remote server model and proximity model respectively. The GBDe studied the phone bill-based IMP for remote server model and NFC IC card based IMP for proximity model. The reasons to focus on phone bill and IC card based are outlined below:

1. Market and technical trend
2. Customer base and need
3. Minimal extra cost for Content Providers
  - Well established billing mechanism
  - Forecast infrastructure developing in the world
  - Low extra handling cost
4. Ease of System Integration
  - Making use of roaming & international settlement
  - Support the international technical standard
5. Ease of use for Customers
  - Simple payment method
  - Convenient and fast
6. Security
  - Well recognized AAA mechanism
  - Chip level security

### **3.1. Phone bill-based IMP**

The cases investigated in this section include Japan, Korea, Taiwan, China and Europe. The phone bill or virtual account based micropayment is quite popular in the Asian region, particularly in Taiwan, China and Korea. All of the IMP issues concerning Taiwan, Korea and China have also been fully investigated through a real commercial trial run.

#### **Europe**

Daopay is one of the typical IMP methods in Europe that use a monthly phone bill. Basically, all the customers having a phone can use the payment service. Daopay claims that their service is available in over 250 countries, with most of the linked websites concentrated in Europe and North America. None of the taxes are included in the list price and these vary in different countries. There are two reasons for that - one is that the rate of international phone calls for different countries is not the same and the other is that the tax rate in each country is different. This is a simple system integration issue because all the interfacing systems follow internet protocol and the 128 bits SSL encryption standard. The settlement is processed once each month except for the initial transaction, which is completed within 60 days.

#### **Japan**

Until now, there is still no real case for phone bill based IMP in Japan. However, there are phone billbased micropayments such as @pay, PayOn and CoDen which, due to user preference and payment trends in Japan, are limited to domestic transactions. PayOn is for OCN Users (NTT Communications). CoDen is for NTT Communications Users including OCN (an Internet Service Provider). NTT Communications provides not only ISP, but also phone, e-money and several services.

### **Taiwan, Korea and China**

An IMP commercial trial run between Taiwan and Korea is underway, and was scheduled to be launched in October 2006 with the support of the GBDe. Similar trials with China and Taiwan are also in progress and are expected to be set up before December 2006. The issues and policies associated with these commercial trials are summarized below.

### **System integration**

Because all of the existing operating payment systems in the project are following the same protocol, system integration is quite smooth between the Taiwanese IMPC and Korean IMPC or between individual IMPCs and corresponding payment systems. The communication protocol Taiwan, Korea and CNC adopted is https protocol with 128 bits SSL and the data structure is XML. Major concerns during the system integration stage have been the overall user's flow and the responsibility for authentication and authorization. For China trial, the CNC plays both IMPC and CP role. For this reason, they have had to modify their system slightly to meet the common user's flow. On the other hand, the SSL certificate adopted is also one point to concern for system integration. Currently, there are three options. They are:

1. International SSL certificate issued by VeriSign
2. Private SSL certificate issued by individual institute
3. Negotiated proprietary SSL certificate.

On analysis, the international SSL certificates issued by VeriSign are recommended in order to provide the greatest opportunity to extend IMP to other countries.

### **Taxation**

Basically, all taxes are charged additionally, including the withholding tax, and commission fee for each IMPC, except VAT (value added tax). This means that the withholding tax and commission fee for each IMPC are not included in the list price of the goods. Although this is likely to bring about disputes during the transaction flow, it can be solved by clear declaration and notification during critical charging nodes. With regard to VAT and withholding tax, generally, these two taxes are not fixed and depend on the regulation of each country. Fortunately, most countries in Asia impose the same percentage of VAT, i.e. 5%. However, withholding tax is not homogeneous among different countries and IMPCs operated by different institutes.

### **Content Policy and IPR**

Content issues can be divided into two major themes. One is the nature of content and the other one is the issue of extending copyright licenses to foreign countries. According to the GBDe survey, the major content in IMP commercial trial runs are music, games, drama and the content about celebrities in the entertainment business. Popular dramas with local culture features as well as music and the content by superstars are always the most favorite items. Due to variation of regulation/policy in different countries, the content allowed for sale is quite different. For example, the content allowed to be sold in Taiwan might not be allowed for sale in China. Therefore it was agreed to adopt a common policy which requires that any kind of content sold via the IMP website has to be verified and approved in advance by each country. Furthermore, the selling parties

have to comply with related IPR regulation and ensure that all the content is legal for usage in specific countries, even if it might increase the cost of content.

### **Settlement**

The settlement method and its period are closely related to the operational cost and management risk. To ensure the correctness of each transaction, a daily batch check between transaction systems should be carried out. However, to reduce the cash transfer cost incurred by any bank, longer settlement periods such as three months have been suggested. The US dollar is being used as the common currency on the pricing list among the bill settlement for all IMPCs except for RMD in the case of China. The cash transfer rate is referred as the last day of the transaction date.

### **Consumer dispute handling**

Consumer disputes can be divided to two types based on the transaction flow. One type of dispute happens during online transaction and the other type occurs after receiving the bill. Generally, the first type of dispute has to be solved immediately. Therefore a customer service center needs to be set up and work online. The first type of dispute can be further divided into two categories by handling responsibility: one is handled by the content provider and the other by the payment service provider. The former generally has to be solved through cooperation with the foreign IMPC. The latter may be solved by domestic payment service provider. The observation is that most of disputes can be solved through the handling process via the mechanism mentioned above. Additionally, disputes can be still solved through the organization of national dispute handling association such as SOSA, ECOM and BBBOnline.

### **Risk management**

The major risk is caused by the bad debt. Phone bill based IMP belongs to the category of post-payment. The payment risk may be taken by payment service providers and merchants. Although the actual rate of bad debt in each country is quite different, a common policy is still needed. The risk of bad debt is taken by merchants in Taiwan and Korea. However, the risks of bad debt, which can not be verified to be from illegal methods, are still taken by payment service providers and merchants in China. To find a common ground for a consistent policy, the payment service providers will be required to manage the risk and probably will need to reflect it in the commission fee.

### **3.2. NFC IC card-based IMP**

In past years, most IC card based payments were based on the financial debit card. However, because of the growth and promotion of NFC technology, the prepaid e-wallet embedded in the IC card is becoming more widespread. An NFC credit card that supports micropayment is also combined with an NFC chip to extend the applications of the IC card. Basically, the NFC payment solution is similar to the IC card type but it is contactless and can use card readers. So, developing applications combining the IC card and NFC has become a market trend. Integrating the NFC function embedded smart IC card with mobile phone has also become a new fashion. Although the applications with NFC micropayment have been developed internationally, the IC card based IMP with NFC function is still not available except in domestic applications. The big issue of

“International” MP with an IC prepaid type card is currency settlement. A prepaid IC card is an immediate transaction, so it is very difficult to exchange from foreign currency to domestic. (The currency market is also moving dynamically. It is hard to choose the correct currency rate.)

### **Japan**

The typical example is NTT DoCoMo Felica payment service. KDDI also has a similar micropayment solution. The characteristics are summarized below. The typical example is IC prepaid type card service (or chip embedded on mobile phone) on Felica standard such as “Edy” or “Suica”.

- Technical Standard: proprietary and called ISO 14443 type C.
- Physical body: embedded in the operator’s handset and IC card.
- Scalability: 20 million users at least, about 370,000 merchants as of Aug. 2006
- Tax: 5% VAT
- Commission: charged from merchant.
- Payment method: prepaid e-wallet and contactless credit card.
- Application: e-ticket for train (not only JR), vending machine, corporate ID card or student ID, point accumulation, physical shopping and check in for airline.
- Available area: Japan only and NTT DoCoMo/Au (KDDI) handset and several type of IC card such as corporate ID card, airline mileage card.

Felica uses IC card technology which was developed by SONY. This NFC communication protocol was standardized in December, 2003 as ISO 18092. For example, applications which run on Felica are “Edy”, “Suica”, “Pitapa” and some other IC cards. Mobile phone service providers such as NTT DoCoMo or Au (by KDDI), embedded this Felica IC chip on their mobile phones. SONY and NTT DoCoMo have agreed to establish a joint venture company of new mobile Felica service. Octopus card in Hong Kong uses the same Felica technology.

### **Korea**

SKT announced an NFC mobile payment field trial through cooperation with Philips on May 17, 2006. The field trial system will provide 400 SKT employees and visitors with NFC-enabled mobile phones to access a variety of NFC applications by simply swiping a mobile phone. The initial applications of the trial include:

- Active Posters, which are smart objects and labels that offer access to embedded content such as ticket information, ring-tones and wallpaper for mobile phones. Users will be able to download ring tone and wall paper by swiping their NFC phones to the poster.
- To pay and access public transportation system by their NFC phones or download schedule of public transportation.

### **USA**

Since December 2005, Visa and Philips have been working together on a major NFC trial which provides services at the Philips Arena stadium in Atlanta, Georgia, allowing sports fans to easily buy goods at concession stands and apparel stores. Additionally they are able to access and download mobile content such as ring tones, wall papers, screen

savers, and clips from favorite players and artists by holding their NFC-enabled phone in front of a poster embedded with an NFC tag. Other partners include Nokia, Cingular, Visa, Atlanta Spirit, Chase, and VivoTech.

### **Germany**

On April 19, 2006, Philips, Nokia, Vodafone and the Rhein-Main-Verkehrsverbund (RMV), the regional public transport authority for the Region Frankfurt Rhine-Main in Germany, announced that, following a successful 10-month field trial, NFC technology would be deployed in a commercial environment. Nokia 3220 mobile phones with integrated NFC technology can now be used as electronic bus tickets and act as loyalty cards for discounts at local retail outlets and attractions. Every one of the approximately 95,000 residents in the city of Hanau can use NFC for mobile ticketing in public transportation, simply with the swipe of their compatible phones.

### **France**

In October 2005, Philips, in collaboration with France Telecom, Orange, Samsung, retailer Group LaSer and Vinci Park, commenced a major multi-application NFC trial in Caen in Normandy, France. During the six month trial, 200 Caen residents will use Samsung D500 mobile phones with an embedded Philips NFC chip as a means of secure payment in selected retail stores, parking facilities and to download information about famous tourist sites, movie trailers and bus schedules.

### **Taiwan**

In Taiwan, the typical example is Taipei EasyCard. The original application was only for metro bus e-tickets. Now, its application has been extended to the parking and bus toll system. In the near future it is proposed to combine Taipei EasyCard with mobile phones. System characteristics are listed below:

- Technical Standard: proprietary and called Mifare contactless protocol.
- Physical body: card
- Scalability: 1.5 million cards at least.
- Tax: 5% VAT included in ticket price.
- Commission: got from bank.
- Payment method: prepaid e-wallet.
- Application: Taipei city metro, parking on metro state and Taipei public bus.
- Available area: Taipei city only.

Other examples are Taiwan money card and contactless credit card issued by Chinatrust bank. Taiwan money card adopts Mifare protocol and ISO 14443 type B (T=CL), a protocol which is adopted for all of contactless credit cards issued by bank in Taiwan.

### **Malaysia**

Designed for multi-purpose application, the MyKad card is highly promoted and enforced by local government. Currently, the multi-purpose card does not yet support a contactless function yet. The related information is listed below.

- Technical Standard: contact card protocol.
- Physical body: card

- Scalability: all citizens of Malaysia should be applied.
- Application: personal ID card, passport, driver license, personal health.
- Available area: Malaysia and Brunei.

The first problem encountered when extending NFC IC card based micropayment to cross border transaction, is the interoperability of technical standards. The solution is either to follow a common technical standard or to support NFC technical standards for all of the client devices and card readers. Additionally, there are still the following issues for NFC IC card based IMP:

- Support of financial organization
- Support of payment service/platform provider
- Support of mobile operator and manufacture vendor
- Support of NFC chip supplier
- Participation of merchants
- Taxation issue for payment of prepaid e-cash

The support of each player depends on potential benefit. The support issue will not be a problem as soon NFC IMP can deliver benefit to all players. Hence, both the technical interoperability and commercial client device ready should be the first issues in the initial stage of promotion.

#### **4. Conclusions of the Case Study**

##### **Heterogeneous in technical protocol**

The case study of phone bill-based IMP shows that the communication protocol as well as secure process being followed are almost the same, with secure http protocol in 128 bits SSL and XML data interfacing being commonly adopted, although some differences do exist in particular micropayment systems. This situation will facilitate the integration of systems in each country.

##### **Heterogeneous in adding the rising cost from MP to IMP to the beneficiary**

All of the costs of MP to IMP will be imposed on the “beneficiaries” in order to keep the consistence in domestic payment operation. The “beneficiaries” here may include the consumer and/or merchant. Furthermore, the taxation rate is not uniform for each country. The GBDe believes that adding tax and processing cost of IMP to the list price of goods is acceptable.

##### **Content access policies for IMP are not unified among countries**

The case studies indicate that some differences exist in content access policy among countries. That is, the regulation on access to foreign content and content provision to the foreign people are different. Fortunately, content access for the entertainment field is almost the same.

**Future of NFC micropayment, even of NFC IMP, is promising**

In spite of existing differences among NFC technical standards, the case study shows that the business of NFC micropayment is growing fast. It is reasonable to be optimistic about IC card-based IMP if an NFC technical solution is clear and more successful business models are realized.

**5. Recommendations**

**Encouragement in taxation policy**

High frequency and small amount per transaction are the characteristics of micropayments. The situation is also similar for IMP. High tax imposed on cross border transactions will be a barrier for IMP in the initial stages. To encourage and promote the growth of cross border e-commerce, governments should create an incentive-based taxation environment in which unequal tax is eliminated or reduced.

**Creating a more open financial policy**

With the advance of e-commerce, more and more players are joining because of the multiform nature of e-business. Besides the financial industry, which deals with real cash transfer, governments should make a more open operational policy for IMP business. Governments should lift restrictive regulations and allow non-banks to enter the micropayment arena.

**Active and effective preventing the cyber crime**

Cyber crime not only discourages the willingness to purchase via the Internet, but also increases the operational costs of merchant and payment service providers. In order to speed up the growth of cross-border business, an effective preventive action for cyber crime is very important. Governments should take an active role in fighting rapid and growing cyber crime to ensure privacy online and to protect payment and transaction information.

**Unification in technical standard**

Some differences still exist in NFC IC card-based micropayment systems in spite of the fact that most of phone bill based micropayment systems follow almost unified technical protocol. To enlarge the market and to speed up the growth of NFC IC card based IMP, the chip and client device should be compatible with all of the NFC forum standards such as ISO 14443 type A, B or C. Additionally, the technical specification of commercialized combi SIM chip should be ready and open as early as possible. The differences among payment systems in technical flow should be negotiated to reach consensus for phone bill-based IMP. To aid the development of mobile NFC IMP, governments should encourage and enable the dialogue and negotiation among vendors, banks and solution providers.