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## CUSTOMIZED E-COMMERCE PAYMENT MODEL THROUGH CELL-PHONE ACCOUNT: A CASE OF BANGLADESH

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### Abstract

This exploratory study addresses an alternative e-commerce payment method via cell phone account. The increasing popularity of electronic commerce and the widespread use of cell phone can be made an interesting substitute method of e-commerce payment for customers and merchants. This paper represents a new method of e-commerce payment system to improve business processes and increase customer trust. The proposed model, based on the secondary data, is a guideline for the real life application those are connected to the low income community. This model would be beneficial to the low income community as well as who are incapable of using credit cards but persist cell phones, could use his/her phone account as an electronic wallet. This payment method could be micro or macro payment, by which e-commerce exploration would be applicable possible in Bangladesh which representing one of the developing countries in the world. Due to the convenience, user friendly, more secured, affordable payment method, the suggested model would be highly acceptable to the community. However, the cell phone service providers can introduce this model as a value added service that would also enhance operations to the business community.

*Keywords:* Bangladesh; E-commerce Payment; Electronic Wallet; Payment by Cell Phone; Security

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### 1. Introduction

At present online payment processing is available with a small content but gaining popularity day by day in Bangladesh. 'Brac Bank Ltd.' introduced 'Bkash' service, a joint venture between BRAC Bank Limited, Bangladesh, and Money in Motion LLC, USA (www.bKash.com, 2012), to transfer money through nationwide using Cell Phone number of serving Cell Phone operator in Bangladesh. The best example of Cell phone

transaction in Bangladesh is the payment of 33<sup>rd</sup> BCS Exam (Govt. job recruitment exam) fees through money transfer from 'Teletalk' (Govt. owned Cell Phone Service Operator) cell phone account (www.bpsc.gov.bd, 2012). The ubiquity of Cell Phone phones and their increasing multi-functional capabilities make 'Cell Phone Account Based Payment' a compelling candidate for replacing the physical wallet. The Cell Phone Account Based payment can be a good option for online transaction in Bangladesh with upcoming 3G communication.

This paper reviews developments in ecommerce payment transactions using cell phone Account and its participants. It also helps to understand the existing and proposed architecture of Cell-Phone payments, and the different processing models as well as business models. It also describes the existing deficiencies of the payment models with cell phone Operator-led Payment Model. The risks of Cell-Phone payment and how they can be mitigated to make it user friendly are also described here.

## 2. Literature Review

Electronic commerce or ecommerce is a term for any type of business, or commercial transaction, which involves the transfer of information across the Internet. It covers a range of different types of businesses, from consumer based retail sites, through auction or music sites, to business exchanges trading goods and services between corporations. Ecommerce allows consumers to electronically exchange goods and services with no barriers of time or distance. Electronic commerce has expanded rapidly over the past few years and is predicted to continue at this rate, or even accelerate. In the near future the boundaries between "conventional" and "electronic" commerce will become increasingly blurred as more and more businesses move sections of their operations onto the Internet.

### 2.1 E-commerce Payment Types

Ecommerce payment can be categorized mainly in below three types (Schneider, 2007).

#### *Business-to-Business Payments (B2B)*

Business-to-business (B2B) describes commerce transactions between businesses, such as, between a manufacturer and a wholesaler, or between a wholesaler and a retailer (Schneider, 2007). The best example of it is *bKash*, the money transfer service introduced by BRAC Bank Ltd. and Money in Motion LLC, USA in Bangladesh.

#### *Business-to-Consumer Payments (B2C)*

The scope of these activities is to sell product or services to individual customer. And it is the most important part of the e-commerce business represented by B2C relations.

- Purchasing goods: tangible, require shipping,
- Purchasing information and software: intangible, immediate,
- Purchasing services: intangible/tangible, not always immediate, can be intermediate (by service companies) (Schneider, 2007).

#### *Consumer-to-consumer (C2C)*

Consumer-to-consumer (C2C) or citizen-to-citizen electronic commerce involves the electronically facilitated transactions between consumers through some third party. A common example is the online auction, in which a consumer posts an item for sale and other consumers bid to purchase it (Schneider, 2007).

## 2.2 E-commerce Payment Business Model

Different cell phone based payment business models have been emerged depending on the applicable regulatory climate, consumer culture, and demographics. In the most basic sense, e-commerce payment business models can be classified as bank-centric, mobile-operator led, or partnership led (Merritt, 2010; Boer and de Boer 2010).

### *Bank-led Model*

In the bank-led model, the financial institution controls the customer relationship and provides cell phone services primarily as a new channel to existing services. In this model, the bank account is linked to the cell phone number of the customer. When the customer makes a payment transaction with a merchant, the bank account of the customer is debited and the value is credited to the merchant account (Merritt, 2010; Boer and de Boer 2010).

### *Partnership Model*

The financial institutions, mobile network operators and third-party service providers make up the partnership and collaborate to provide payment services in a partnership model. In this model, it may be possible to capitalize on each organization's respective strengths in terms of providing customer service, introducing innovation, and ensuring an environment of sound regulatory compliance. The financial institution like *Paypal* could be the best example of partnership model (Merritt, 2010; Boer and de Boer 2010).

### *Cell Phone Network Operator-led Model*

A cell phone network operator-led business model limits or eliminates the involvement of the financial institution in the payment delivery, clearing, and settlement. In various emerging markets, the mobile network operators are dominating the cell phone based money transfer market. These corporate are creating customer relationship and providing the value chain with clearing and settlement functions often agnostic to the participation of mainstream financial institutions or central banks (Merritt, 2010; Boer and de Boer 2010).

## 2.3 Technologies Available for Cell-Phone based Payments

According to International Telecommunication Union's Telecommunication Standardization Sector (ITU-T) cell phone could send or receive information through four possible channels, namely Voice-call, Short Message Service (SMS), Unstructured Supplementary Services Delivery (USSD) and data service like Wireless Application Protocol (WAP), General Packet Radio Service (GPRS) or Enhanced Data rates for GSM Evolution (EDGE) (www.itu.int, 2012). All these channels are secured way of communication and choice of the channel implementation depends upon how it will fit with payment system and also depends on user friendliness.

### *Voice call*

This is a main and primary feature of cell phone to send or receive information. During e-commerce transaction period, the system generated password could be sent for the authentication and verification of the user and the user account using system generated voice call. This is most like two steps verification process for the user verification by "Gmail".

### *Short Message Service (SMS)*

This is a text message service that enables short messages (140 to 160 characters) that can be transmitted in between cell phones. This service has an access channel to phone which is different from voice channel as well as SMSs are stored and forwarded by SMS centre provided by cell phone operators through a secured way. In the

proposed e-commerce payment model, SMS could be used to provide information about the status of one's account as well as to transmit payment instructions from the phone.

### Unstructured Supplementary Services Delivery (USSD)

Unstructured Supplementary Service Data (USSD) is a technology unique to GSM (Global System for Mobile Communications). It is a capability built into the GSM standard for support of transmitting information over the signalling channels of the network. USSD is session based transaction-oriented technology while SMS is a store-and-forward technology. Turn around response times for interactive applications are shorter for USSD than SMS.

### Phone-based Application (Java/Android)

The mobile payment application like "Jong" could be installed on the cell phone of the customer (www.jong.com). Using this application, cell phone can be used as smart card or credit card with the availability of data service. For this technique, data service enabled Java or Android supported handset is required.

## 3 Study Design and Methods

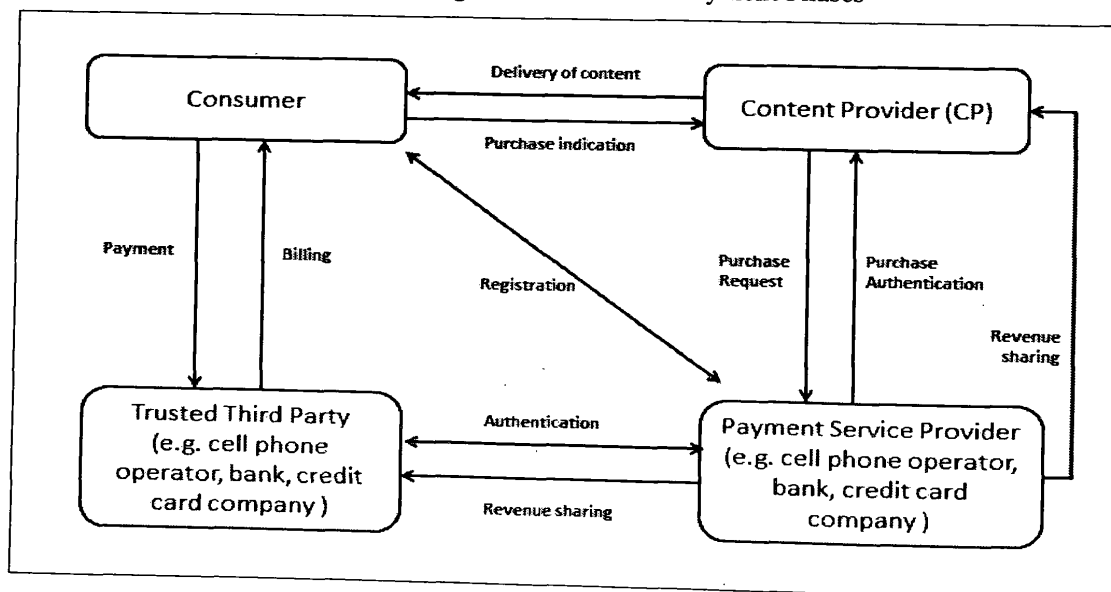
The analysis of this research is based on secondary data, including online databases, digital libraries, books, journals, conference papers, etc. Extensive e-commerce research papers of academicians and practitioners are evolved from renowned international journals, namely PROQUEST, EMERALD, EBSCO, IEEE, ACM, JSTOR, Science Direct, etc. The researchers developed the conceptual framework of e-commerce payment model based on theoretical existing model.

## 4 Cell Phone Network Operator-led Payment Existing Model

### 4.1 Theoretical Model

Most cell phone based payment solutions have been launched based on bank account or credit cards issuers with the support of cell phone services providers. Cell phone based payment infrastructures were based on four-parties models which gather the consumer, the merchant, the trusted third party and the payment service provider. The main steps of transaction layers for a mobile payment among four parties are described in figure-1 below (Ondrus and Pigneur, 2004; Buhan, 2002).

Figure 1: Existing Cell Phone Based Payment Phases



In this payment system security is a critical factor for mass adoption. The transport of payment details in this mobile environment includes the mobile network operator and uses either a browser-based protocol such as WAP or HTML, or a messaging system, such as SMS or USSD. Alternatively, the transport of payment details could be sent via Bluetooth, infrared, RFID or contactless chip in the case of proximity payments.

Consumers need a secure and user friendly payment system that they can trust. Since information is transfer through intranet or most cases internet, there always exists an end to end transection security. The problem is bigger for micropayments than micropayments. Simplicity and security features need to be aligned with the financial risk that customers and merchants take during the transaction and here comes a need of reliable payment system.

## 5 Cell Phone Network Operator-led Proposed Payment Model for Bangladesh

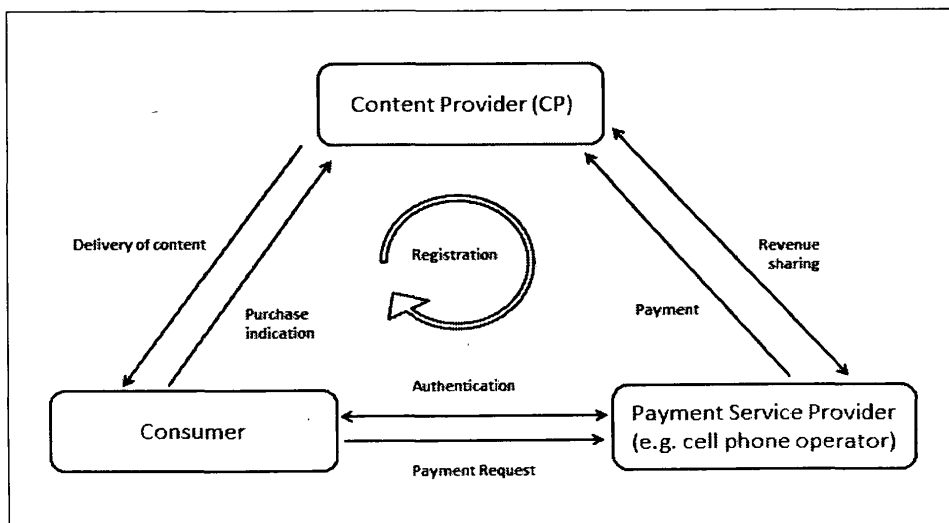
The cell phone technology provides various possibilities for implementing ecommerce payments. The proposed cell phone network operator-led payment model could thrive in developing market like Bangladesh because of the ability to reach large numbers of unbanked people in physically remote locations beyond the presence of bank and landline infrastructures.

### 5.1 Proposed Model

The cell phone network and communication infrastructure is an important and critical part for e-commerce transaction and payment processing infrastructure. Reliability, bandwidth, security, quality of service (QoS), availability of network infrastructure, and network communication costs are the important factors determining the network architecture and topologies, which needs to be deployed to support real time cell phone business and payment transactions. The following pictorial representation in figure 2 is the holistic view of network connectivity links which are required to build a network infrastructure that can support a cell phone transaction and payment processing services. Three network connections are required for this payment model.

- Network connection between the cell phone clients and cell phone network operators
- Network connection between primary and secondary data centres hosting the cell phone transaction and payment processing services, as required for payment authorizations and settlements
- Network connection between the organization's data centre and externally located ecommerce service providers.

Figure 2: Holistic View of Cell Phone Based Payment Model



In this payment model registration is prerequisite for each party. And the connectivity between consumer and content provide established during the web surfing only. The detailed payment processes are mentioned in cell phone payment transection layer.

### 5.2 Cell Phone Payment Transaction Layer

Like most service-based products, a traditional online or electronic payment is a process typically comprising of most or all of the following process steps (Microsoft and M-Com, 2009; Goudar, 2012):

- Service Registration. The consumers need to register the service first with the cell phone operator.
- Payment Request. The consumer initiates a payment to merchant and made a request to cell phone operator for the payment.
- Payment Authorization. The cell phone operator authorizes the payment including authentication before it is processed. Here authorization code would be sent to consumer via SMS.
- Payment Confirmation. Confirmation of the payment outcome is provided to the consumer.
- Payment Report. The consumer can review the payment that took place, at some point in the future.

Figure 3: Traditional Online Payment Layer

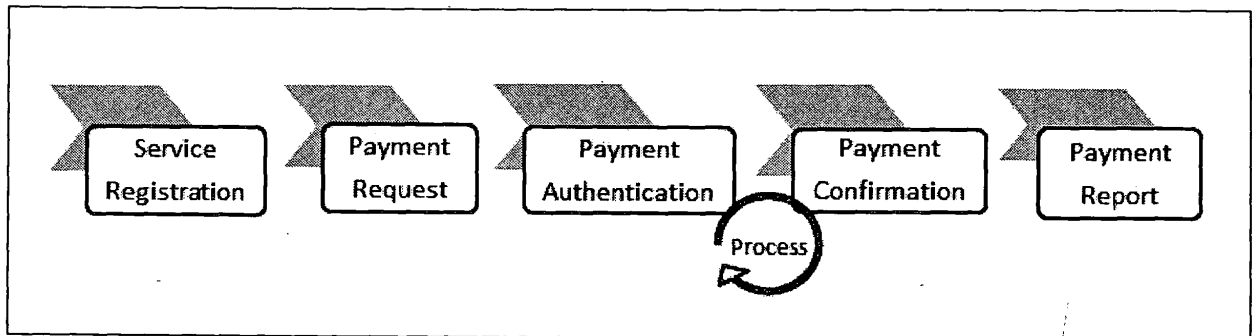
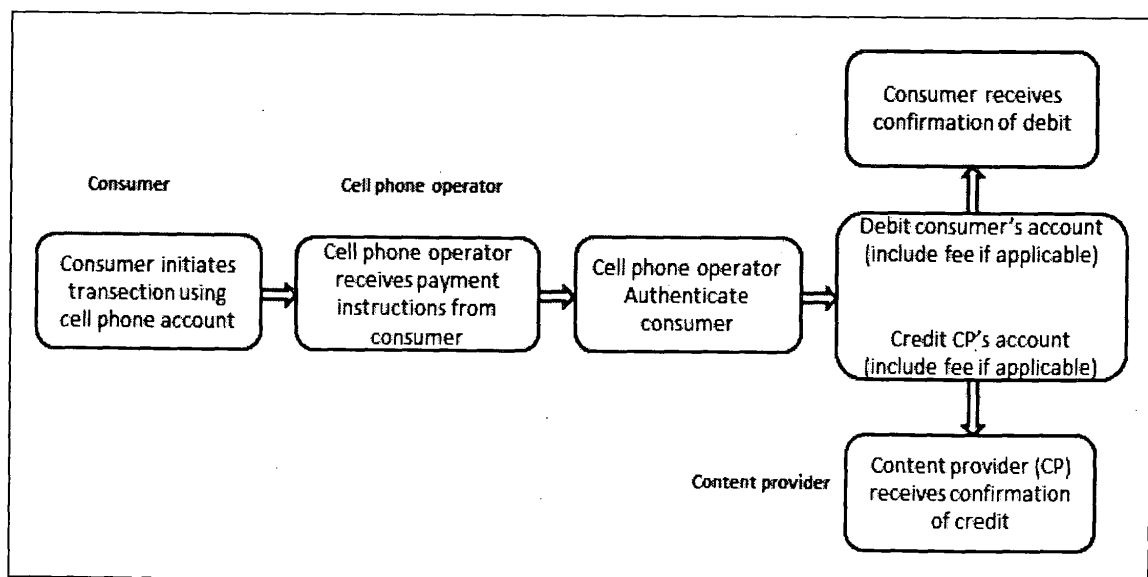


Figure 4 illustrates an example of the cash flow in Cell phone money transfer maintaining the above mentioned steps.

Figure 4: Cell phone Account based Payment Transaction Layer



In this figure-4, the network operator performs clearing functions for the sender and recipient of the funds in order to complete the transaction. The Cell phone user first sends a text message to instruct the Cell phone operator to execute a transfer; the message includes the transaction amount to be transferred along with the user code of authorization. The Cell phone service provider typically transmits a text message back requesting the sender's personal identification number (PIN) to confirm the transaction. After user verification the Cell phone operator debits funds from the message sender's cell phone account, and then credits the destination account.

## **6 Cell phone based Payment Scopes and Opportunities**

E-commerce is a faster and convenient than the traditional methods of buying goods and services. A variety of industry specific cell phone commerce transaction services are possible to sell to the customers using cell phone account. Mainly the cell phone transaction processing strategy includes the content based transactions such as music, games, videos downloads; movie ticket, mobile apps transaction charges etc. Other than these content based transactions; customers can use their cell phone account to pay other remote transactions like:

- Utility bill payment – At present Electricity bill is now possible to pay at authorized bill payment point of the Cell phone Operator but as like as financial institute we have to pay the hard cash instead of electronic money.
- Transportation ticketing services – Now Bangladesh Railway tickets are booked over the Cell phone channels and payments for such sales transactions are processed with hard cash instead of Cell phone account payment.
- Hotel booking services –Using Cell phone number travel ticket booking is possible and hotel related booking services are also possible to offer over Cell phone channels. Advance payments for such sales transactions would be possible to proceed with Cell phone accounts.
- Industry specific transactions - Industry specific services like super shop payment are possible for the customers using the Cell phone account.

## **7 Discussion**

Most of business-to-consumer payments over the internet are performed currently via bank account or credit card based payment systems. It requires a large amount of information from the end user which makes payments as a complex elaborated web site interfaces with lack of security and trust. The need for new effective and secure payment systems clearly emerges from this existing situation. Many research works are on-going to develop a secure payment system but this is making payment system more complex to implement. Our proposed model presents a new protocol for the user authentication based on SMS authentication approach which is completely secure and easy to implement. We have also suggested an approach for two-way authentication protocol to authenticate both the parties. The proposed e-commerce payment model through cell phone account has below advantages.

From Customer end:

- This is more secured payment method than existing methods as all information belongs to cell phone operator's server with high security.
- This model allows consumers to pay for both large and small payments according to the available cell phone balance whereas in some cases micro payment can't be done using bank or credit card account.
- In this model consumers need not to pay any yearly charge like bank account or credit cards. So maintenance cost will be lower than existing payment models.

- This system is simple and easy for customers to use as it has less connectivity issue and no more additional information is required in transaction except the password or verification code.
- Operations made nationwide Cell phone coverage and by this advantage transaction will be fast, anytime and anywhere.
- Flexible methods to request for payment with security and trust.
- No Bank account or credit card link up is required for this transaction.

From Operator end:

- New source of Value Added Service (VAS) for cell phone operators
- Customer trust can be achieved with secure network connectivity

From Merchant end:

- No need to maintain a central payment server system which will reduce the business operational expenses (OPEX).
- This model facilitates micropayments and promotes ecommerce revenues creating the opportunity for new ecommerce business providing easiest payment solution.

Lots of challenges like Credit risk for post-paid users, Govt. approval for Policy and regulatory considerations in mobile money transfer systems, Measuring Return on Investment are to be overcome for a successful implementation and to be widely accepted as a mode of payment. Moreover it is necessary to analyse and compare both the developed and developing markets in order to expand the ecommerce market in Bangladesh. Additionally, there should regulation of electronic money with appropriate cyber law to take necessary steps against cyber-crime regarding any-fraud or payment issue.

## **8 Conclusion**

This paper introduced the need for a new e-commerce payment system using cell phone account. For mobile content and service providers, this payment service offers a secure and convenient payment as well as building customer loyalty. It is quite simply an entirely new sales and promotion channel for ecommerce. The big advantage is that the service is available to that consumer anywhere, at any time. In short, cell phone based payment is all about consumer empowerment. Businesses, merchants and consumers have to come forward and make value-producing investments. The right combination of mobile system, Internet, payment, and security technologies could make mobile payment a commercial reality. A regulatory framework and widely accepted standards should be followed on which mobile payment architecture will stand strong.

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