

Online Electronic Bill Payment by Post-Paid Card Using Virtual Banking Concept

Md. Moinul Hossain, S.A.M Motakabber[†], Mohammad Tarequl Islam, Md. Liakat Ali

Dept. of Computer Science & Engineering, International Islamic University Chittagong, Bangladesh.

[†]Dept. of Computer & Communication Engineering,

International Islamic University Chittagong, Bangladesh.

asambdctg@yahoo.com, motakabber@lycos.com, arman_cse@yahoo.com, liakat3026@yahoo.com

Abstract

Paper bills are now the prime instrument of communication between billing companies and their consumers. However, their potential for interaction is limited, and they are not interactive. In traditional system, paying bills presentment and payment systems are pretty straightforward, the different billing companies send a paper statement to present their bills, and the consumers pay these different bills by the banking process of their assigned bank with a huge congestion. But our research concerning these Existing payment systems can easily be changed through electronic system by a little bit change of existing system, without absorbing existing banking procedure or financial institute and involving virtual banking concept. Our electronic bill payment is the business-to-consumer (B2C) and business- to business (B2B) and more specifically through remote bill payment system, Most of the consumers can pay their bills by the online, digital phone, mobile phone (T&T incoming and Outgoing) from anywhere in the country. The propose system provides post-paid card, which may be available in the market, and consumer can easily collect this card from any place and do the payment.

Keywords: Biller Organization (BO), Central Organization Post-Paid Card, Virtual Bank.

Major Area: Major area of this work is to develop servers based post paid system, which can be useful in the organizations such as PDB, T&T, WASA, Gas Supply Authority, all kinds of TAX etc.

I. INTRODUCTION

The concept of electronic bill presentment and payment is not latest news. But existing Electronic Bill Payment and Presentment (EBPP) is a feature of online banking. It is one of the more complex Electronic Commerce undertakings, requiring the coordination of a multitude of billers, banking institutions, software developers, and infrastructure providers. In addition to the complexity of delivery, consumers demanded a compelling and low-cost offering. Early forms of electronic bill payments included preauthorized payments from the consumer's bank account or consumer-initiated electronic payments

from a computer running home banking software with a bill payment feature. Electronic bill payment was widely predicted to create economic and commercial incentives to billers and consumers, but it met with resistance from both groups. While preauthorized payments were convenient, consumers were reluctant to give up control of the timing and amounts of their payments. With consumer-initiated electronic payments from a PC, the consumer retained control, but billers had to continue sending paper bills and the payments did not include all the information they desired. The existing Electronic Bill Payment and Presentment typically requires interaction among three key parties: the biller, the consumer, and the consumer's financial institution [1] [2].

The focus of this paper is to present a feasible, convenience, reliable, time and cost saving post-paid billing system using virtual banking concept. There is no direct relation with the existing saving bank or consumer's financial institution and biller organization has no required individual presentment process to represent the consumer billing information. We also propose, how and who generates the post-paid card and how it's works for e billing, architectures of the virtual bank and its works and who get the facility and internal control flow of payment systems.

II. EXISTING BILL PAYMENT SYSTEMS

There are several types of bill payment systems in existing system. Such as Check, ACH, credit card, debit card and prepaid card etc. The payment component of existing EBPP system is sometimes accomplished via paper check if a biller participating in an electronic transaction cannot receive electronic payment. In these cases, the consumer often provides electronic payment transactions to the service provider, but the service provider executes the payment by writing a check to the biller [3] [4]. ACH is another most common electronic payment option used for consumer bill payments. ACH transactions are sometimes perceived negatively by consumers citing due to a need for greater control over the timing and amount of their bill payment. Consumers have the option to pay bills through one-time ACH credit transactions initiated through their financial institutions, through one-time ACH debit payments authorized online or through the more traditional

automated recurring debit transaction authorized online or via paper. [3] [5]. From a biller's perspective, credit card transactions are generally more costly than other electronic payment of electronically presented bills. Offline debit cards are the most commonly used because these transaction can be processed offline through the credit card networks. Online debit transactions have not been used on a widespread basis, which may be because there is no standard industry model for authenticating consumers' identities and for connecting with the ATM networks to obtain the instant verification of funds availability that is process online debits [3][5]. Prepaid card EPS can be also included in the same category of electronic cash, because the principle of their work resembles the use of e-purses. Users can buy a prepaid card for a specified amount. Prepaid card systems are specifically designed for Internet payments. Users can pay with a prepaid card by entering on merchant sites the card's unique number, which corresponds to the cards nominal. The value of the card is decreased by the amount paid to the merchant [7].

III. EXISTING BILL PRESENTMENT SYSTEMS

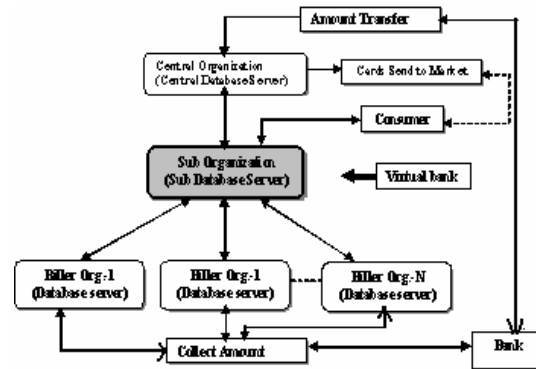
When an organization decides to implement an EBPPS, and then there are two primary bill presentment models i.e. the biller-direct model and the consolidation/aggregation model to be considered. With the biller direct model, the consumer accesses the information through the biller's website to view and pay bills. The biller fills the roll of both service provider and consumer service provider [8]. The disadvantage to implement the biller-direct model is that it is expensive to establish, design, host and maintain in house application. Another Consolidators and aggregators model are independent organization that collect the billing information from multiple billers and present it on their own consolidated websites. A consolidator is a biller service provider, and an aggregator is a consumer service provider. An organization can, and do performs both roles, providing consolidation services to the billers as well as maintaining a website service for consumers to aggregate and access multiple bills. Consumers sign in with the aggregator to get the convenience of reviewing and paying multiple bills at one website [8]. Within the aggregator /consolidator model, it may be two sub models such as, one is Thick model Consolidation/Aggregator and another is Thin Consolidation/Aggregator. Under thick consolidation, the consolidator maintains both the summary and details of the consumer's billing information. Under the thin consolidation model, the biller maintains the details of the consumer's billing information while a summary is forwarded to the consolidator. Consumers can view a summary of their bills on the consolidator's site, while

those desiring to view the details are linked to the original biller website [3].

IV. OVERALL CONCEPT OF THE PROPOSED SYSTEM

The overall EBPS process can be divided into three major components. Such as, service commencement or generating cards, Presenting the bill or invoice, and making the payment.

Figure -1 Overall Concept of the Proposed System



Central organization is the core organization of the system, which maintains the central server database and generates post-paid billing cards with a secret numeric number, categorized these cards for sub organization, categorized for the amount and sends the cards in the market for the consumer. Finally these card numbers are forwarded to every sub organizations according to the sub center cards. Another task is, it is linked with the banks to keep the records of the every biller organizations financial information by the sub organizations acknowledgements. All times it is necessary to communicate with every sub organization and up to date their information. This organization may be handled by the govt. or any other private organization.

B. SUB ORGANIZATION (SO) OR THIRD PARTY ORGANIZATION (TPO)

Basically electronic bill presentment and payment system by the post-paid card using virtual banking concept is directly controlled by the sub organization or third party organization. These organizations always observe the consumer payment, biller organization manner, and central organization position. It maintains the sub center database, which keeps the cards numbers database that is forwarded by the central server, consumer account information, consumer ID and keeps the biller organization financial information. These organizations also up to date the information, which is always transferred to the central organization. It always

communicates with the central organization, biller organization and keeps up the database more secured. It may be sub organization of central organization or another private or public organization. Basically it's a web server, relational database server and it's our consumer virtual Bank where consumer rest amount will be stored.

C. BILLER ORGANIZATIONS (BO)

Biller organizations are another type of organization, where they get the facility of the electronic bill payment system by the post-paid card. These organizations always communicate with the sub organization and it maintains the biller database server. This sub organization performs the consumer expectations and keeps the records of the each consumer. It also keeps the consumer database. These organizations are first to collect the consumer information such as how many amount will be pay for each consumer. Mostly they are related to the central organization for their financial information. Otherwise they are always handling their consumer expectation. When the BO to take the electronic facility they must first need to registry to the SO.

D. CONSUMERS

Consumers always communicate the SO or third party organization, when they pay the bill by the website or any other payment system, before they must collect the post-paid cards from the market. Every consumer can easily keep his or her ID and card numbers more safely. Consumer ID is the most important factor for the consumers ID and the BO for their ID provides it. Consumers can always get his billing information and others new information from the SO website.

E. BANKS

Actually banks are the out side factor of our proposed system but it must be needed for the money exchange policy and its only related to the central organization in which manner every SO can collect their right amount from the local branch of the banks.

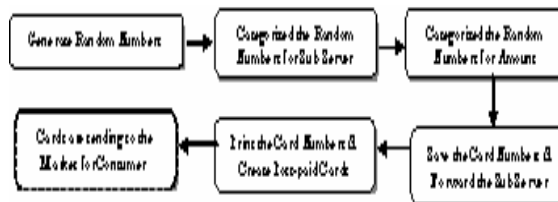
V. POST- PAID CARD MODELING

A. THE CARD GENERATION

At first we generate a set of random numbers each of the numbers is twelve digits long. Actually each of these twelve digit numbers are combinations of two groups of random numbers each of these two groups again contain six digits random number. Example of the first six digits is "654327" and second six digit is "678787". Then twelve digits random number is 654327678787. In the 2nd step we categorize the generated set of random numbers for the SO. These

separated random numbers identify the location where it is used and valid. In this process, at first we append four digits from each of these twelve digits. If summation value can satisfy the given condition or range

Figure -2 Overall Process of Creating Post-Paid Card



then this value represents the specific district. Basically it's a location code. Suppose location X for given range (0-6), location Y for given range (7-12), location Z for given range for (13-18) and so on up to summation value 36. So this random number automatically defines the location Z because their summations range (13-18). Similarly the next step we categorize the separated location random numbers for the card's amount. But in this step, at first we append middle four digits from each of these twelve digits. If middle four digit's summation value can satisfy the given condition or range then this value represents how many amount is stored in this card. Suppose card's amount is 200 for given range (0-5), 300 for given range (6-10), and so on up to summation value 36. So this random number automatically defines the card's amount 1000, because its summation ranges (21-25) and next step, separated card numbers finally stored in the CD and if stored successfully then forwarded to the SDS. Finally CO can print cards amount numbers according to their necessity and how many cards are demanded for the markets and finally create the attractive post-paid cards for our proposed EBPP system and, after creating post -paid cards, these cards are sent to the market for the consumers. Consumers can easily take his or her required cards from the adjacent dealer or any organization, where the post -paid card found available and recharge their account or pay their household payment by the EBPPS.

B. CONSUMER IDENTITY

In our proposed system biller organizations can assign their consumer ID in different ways. But we are mention the one possible way in table 1.

Table-1 Consumer Identity Model For The System

Organization Name	Organization Code	Consumer Type	Organization Serial	Consumer ID
Org-1	1	0	876546	10876546
		1	787898	11787898
Org-N	N	0	674578	80674578
		1	762589	81762589

organizational serial is an existing identity number such as consumer meter number, Phone number etc. There are two types of consumer such as general consumers and commercial consumers in our country and our proposed system concern these two types of consumer. We have assigned consumer types by the “0” and “1”, Where “0” identify the General consumer and “1” identify the commercial consumer. Finally each of these fields creates the consumer ID that is identifying the identity model of billing companies’. Here we have mentioned sample identity model in the following figure 3.

Figure- 3(A) Sample Identity Model of Biller Organization for General Consumer

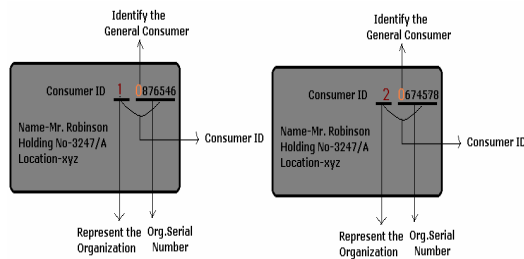
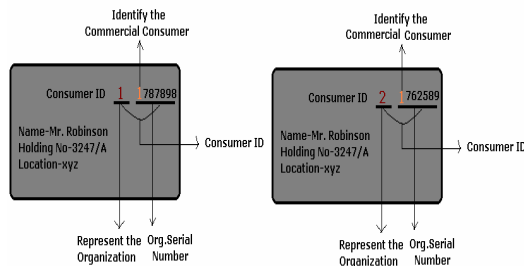


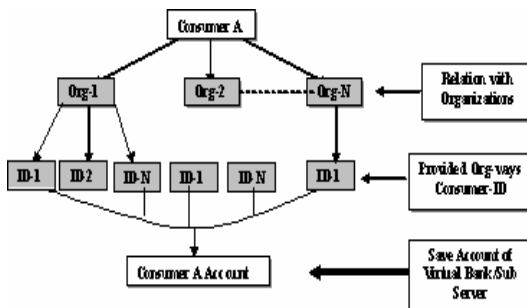
Figure- 3(B) Sample Identity Model of Biller Organization for Commercial Consumer



VI. VIRTUAL BANKING SYSTEM

Virtual banking is a new terminology used in our proposed system and its function is described in the fig 4

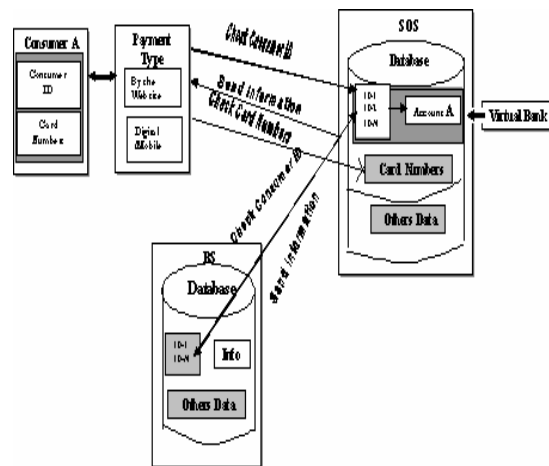
Figure-4 Shows the Virtual Banking System model



From figure 4 we can see that consumer “A” has relation with the different types of billing companies. These billing companies provided the different types of consumer ID such as org-1 provided (ID-1, ID-2 and up to ID-N), org-2 provided (ID-1 and up to ID-N) and org-3 provided (ID-1). That is, consumer “A” takes the different types of facility from the billing companies. In SOS, each ID has combined with the unique account (Consumer A account) for consumer ways that is finally store in the virtual bank.

VII. CONTROL FLOW OF THE PAYMENT SYSTEM

Figure-5 shows the overall internal control flow of the proposed system.



In the EBPP system it’s a gorgeous payment process when the consumer desires that they must have payment in a time then consumer will pay their payment from anywhere they stay. If the consumers has sufficient money in his account or post paid card. The EBPP system provides the different types of payment process that is accessible in our household such as by the website, by the digital phone, by the mobile phone. Consumers can easily pay their payment using the payment process. Figure 5 shows the internal control flow of payment systems. In the payment system, consumers can choose their payment types as example, Website, digital phone or mobile phone. But before they must collect the post-paid card from the market if they had not enough money in his virtual account. When consumers enter the ID then it automatically checks the SOS or TPOS and BOS, whether the consumer ID is valid or not (If consumers choose the digital or mobile phone for completed his payment before they must enter the T&T sub exchange number which is define by the authority). While the organizational ID is valid for the SOS or TPOS and BOS then the consumer can view his billing information according to the biller organization ways and his account status (For Digital or mobile

phone, they will get the voice message). Next step choice option for Consumer, in this step, if consumers has sufficient fund in their account then they can transfer required fund for the biller or if there is no sufficient fund in their account then they must recharge their account by the post paid cards. After account recharging then they can transfer the amount for the BO. When the consumers recharge their account or required amount for the payment they must enter the valid card number. In this step consumer always recharge their account by the post-paid card numbers. When the consumers enter the card numbers, the SOS or TPOS checks it. If the card number is valid then consumer can recharge their account otherwise the consumer can try again for three times. If consumers try for more than three times the consumer system will be locked. When the consumer card number is valid then the amount of this card will be automatically saved in the consumers account. While the consumer's card number is valid then this card number will be deleted the CS and SOS or TPOS, and the CS and SOS or TPOS database are updated. When the consumer's account has sufficient amount to pay their payment then the biller organizational matched the amount of the consumer account to the amount to be paid, then the SOS automatically transfer this amount for the biller organizational. Finally, if the amount transfers successfully for the biller organization then consumer's account is automatically upgraded and rest of the amount will be saved in the consumers' virtual account.

VIII. SECURITY FOR THE SYSTEM

There are two types of security need for the system, one is Card security another is Net-security. In the card security the policy must be adopt so that the unauthorized person cannot easily generate a false number or card and Net-security is need for safe the system from the net hackers. Both securities are vast and complicated issue and needs a details research in these areas. Authors are conducting a research on these topics.

IX. RESULTS AND DISCUSSION

A prototype model had been designed and implemented and we have got the satisfactory results from it. We had developed a web page and registered a domain name .We also hosted the web page in the domain name as sub-directory (www.lekhapsora.com\elect_payment\login.htm). The domain name was fornishost.com in UK. These servers configured with the Apache web server and MYSQL database server and supportable language PHP.

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