SMS Banking Services: A 21st Century Innovation in Banking Technology

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Abstract

According to the Euronet mobile Banking Guide, there are currently close to 400 Mobile Operators in over 133 countries who are signing up 4 to 6 new customers every second. This implies that more people are going mobile like never before. The novel method presented in this paper is an Interactive SMS Banking Agent that is incrementally scalable for banking operations. Hence, a mobile banking solution called SMS Banking that allows people to bank with their mobile phones is presented in this paper.

Keywords: Banking services, Agent, SMS, Network, GSM

Introduction

SMS Banking is a Mobile technology that allows you to request and receive banking information from your bank on your mobile phone via Short message service (SMS). Individuals or corporate bodies can manage their bank accounts, check their account balances, perform check requests, money transfers, pay some bills, and perform other banking transactions using their mobile phones. There are two methods of SMS widely used in applications; they are the PUSH & PULL (Seylan Bank, n.d.).

Push SMS is sending a message from an application (i.e. SMS Server in this case) to the Mobile Phone. It is a one way message. In other words, it's the mobile application (in this case, the SMS banking application) that initiates a message. An example could be a deposit alert, which alerts the user when a deposit is made to his/her account.

Pull SMS is sending a request and obtaining a reply. This is a full duplex scenario where a user sends a request to the SMS banking application and the application replies with the information requested. An Example is when a user requests his bank account balance.

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The Need for SMS Banking

The telecommunications industry worldwide has scrambled to bring what is available to networked computers to mobile devices (Schofield, & Kubin, 2002). Presently, the use of electronic

banking is considerably high and as more and more users sign up for electronic- banking, the maturity as regards remote banking (i.e. banking outside the banking hall) is on the increase. With electronic banking, users can now conveniently carry out banking transactions, but this convenience cannot be achieved if the user does not have access to the internet, hence, in other words, the user cannot carry out a banking transaction while waiting for a bus, or perhaps while having lunch in a restaurant.

With SMS banking, convenience can be achieved 24hrs a day. This is because a user has access to his mobile phone all day, at all times. So, to effectively achieve a truly convenient banking mode, a truly mobile mode of banking has to be explored, hence the need for SMS Banking.

How SMS Works

SMS stands for Short Message Service; it's a mobile technology that allows for sending and receiving text or even binary messages to and from a mobile phone. The relative ease of use of SMS makes it possible for a user to learn how to send SMS easily. More than 160 billion SMS are exchanged each month in European countries (Mavrakis, 2004).

SMS use the GSM special signaling channel instead of the voice channel and is therefore a very reliable media channel. MAVRAKIS, 2004 identifies two types of SMS which can be classified by the origin of the message

- • **Mobile Originated (MO)**: SMS-MOs' are **sent from** a mobile phone and could be sent either to another mobile phone (such when a mobile subscriber sends a personal message to another subscriber) or to a computer application that will process the message.
- • **Mobile Terminated (MT)**: SMS-MTs' are **transmitted to** a mobile phone. They also could be sent by another mobile phone or generated by a computer application.

The SMS processing computer applications usually runs on corporate servers that are connected to the SMS network through specialized connectors and gateways connected to the SMS Centers of mobile operators (Mavrakis, 2004).

These servers are assigned short numbers instead of the traditional 10-digits mobile numbers. These numbers, also known as short codes are usually 4 to 6 digits long. These numbers are operator specific. Also, a premium fee (a fee other than the fixed rates for SMS) can be charges on these short codes; in other words, users would pay more for sending SMS to short codes.

Data Mining In SMS Banking

Due to the large number of users and the large amount of financial transactions expected to be carried out using SMS Banking, there is a need for methodologies of Knowledge Discovery and Data Mining (KDD). *Data mining is becoming increasingly common in both the private and public sectors. Industries such as banking, insurance, medicine, and retailing commonly use data mining to reduce costs, enhance research, and increase sales* (Seifert, 2005).

The question to ask now is, "What is Data Mining?" Seifert (2005) defines Data Mining as the use of sophisticated data analysis tools to discover previously unknown, valid patterns and relationships in large data sets.

Hence, the SMS banking application should be able to effectively analyze all banking transactions. If data is successfully analyzed (mined) over a period of time, the bank can develop models that predict whether a customer is a good credit risk, the analysis can also be used to identify illegal money transfers and frauds. There are basically four issues with data mining, they are

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Data quality: This is a one of the biggest challenges of data mining. Data quality refers to the accuracy and completeness of the data (Seifert, 2005). Data quality is mostly affected by the structure and consistency of the data being analyzed. For example, a user might want to check his account balance but mistakenly enters a wrong account number, this would most definitely affect the result he gets from the SMS banking application.

Interoperability: Interoperability refers to the ability of a computer system or data to work with other systems or data using common standards or processes. Hence, it should be possible for an SMS application to use the data gotten from another SMS application.

Mission Creep: Mission creep refers to the use of data for purposes other than that for which the data was originally collected. This happens when account information and financial transactions are audited against fraud or illegalities.

Privacy: This is of great concern because, users' account information needs to be kept private and at the same time analyzed.

In SMS banking, using data mining techniques, the saving culture of a particular age group can be analyzed. In other words, it is possible to determine the flow of money, that is, in the month of February, for example, =N= 1,000,000 was transferred by people in ages 30 – 65, to people in ages 21 – 29. This would imply that a lot of money is being moved from the older generation to the younger ones.

Analysis of the Existing System

Presently, customers walk in to a banking hall to make transactions, although, these transactions are automated, their presence is still required; a more convenient banking option is the use of Automated Teller Machines (ATMs) as convenient as this method seems to be, the presence of this user is still required. Hence, it is obvious that convenience is the major problem of the existing banking system.

Aside from the manual system, there are existing electronic banking systems; one of such is the Bank Islam, Malaysia which has an SMS Banking System (http://www.bankislam.com). This system allows customers to send SMS to the server and carry out over 30 banking transactions but one limitation in this application is that the server is only available for access between 6am to 12 pm.

The Proposed System – SMS Banking Agent

After a careful review of the above systems, a system that would "bear the cross" of the users as well as solve all the identified problems is been proposed. This system is an Interactive SMS Banking Agent

The Banking Agent receives the text messages from the clients, processes them and sends the output back to the users when applicable.

The proposed system solves all the problems identified in the existing system

The features of the proposed system are outlined below:

1. All phones are capable of sending SMS to it (it is portable)
2. Agent runs on a server, hence there's no need for distribution and deployment
3. Agents run real time 24hrs a day, 7days a week
4. Users get feedback

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System and Software Design

The system is separated into hardware and software.

Hardware

The hardware required includes (See Figure 1):

1. Inbuilt Modem Phone
2. Connectivity Cable
3. Personal Computer

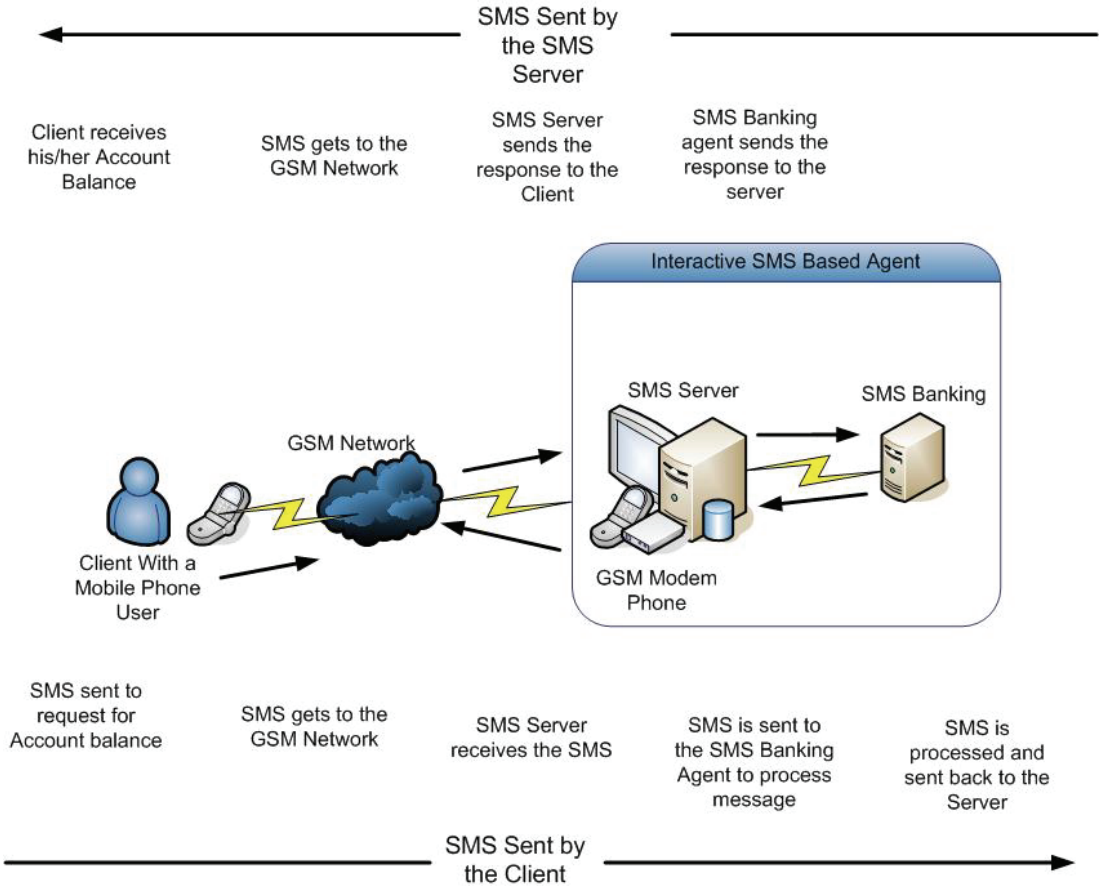

Figure 1: Hardware Architecture Design

Software Design

Input design

The inputs are sent as syntax to the server as a text message, once the server receives the message, it processes it and the output is also sent as a text message back to the client. Below are the input operations which are sent to the server:

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Operations for SMS- Banking: There are a number of transactions that can be carried out using the SMS banking agent. They include almost all functions that are presently being performed in the banking hall. Examples are, creating an account, checking account balances, transferring of funds and changing of pin code.

i) **Creating an account**:

To create an account the user has to send

"CREATE ACCOUNT Accountname" to the GSM number

which is connected to the software. The senders GSM phone number and the account name, which he/she wishes to use, is saved into the database. This module generates an account number and also a pin code and are both saved into the same database. The account name, account number and pin code are sent back to the user's number that requested for creation of the account. The sender receives the message in this format.

Account creation successful: Account name: [Accountname] Account number: [account number] PIN: [pin code]

ii) **Checking account balances**:

To check account balances or status of the account: The user has to send

"CHECK Accountnumber pin code".

This module checks if the user's account number exists and also checks if the pin code sent also exists, if the pin code corresponds with the account number sent, the sender's account balance is sent to his/her GSM phone number which was used to request for the balance. The sender receives the message in this format.

Account Balance as at [Date] is =N= [amount]

iii) **Transferring of funds**:

To transfer funds the user has to know the details of who is transferring the funds to like the account number and also the amount he wishes to send, which is also important in making funds transfer. The user has to send

TRANSFER [senderaccountnumber] [pin code] [Amount] [receipientaccountnumber]

The software receives the message checks if the sender's account details are correct that is the account number and pin code, if the account details are invalid the sender is sent a message notifying him/her of what he/she has sent.

Account details invalid

It then checks the account if fund is available or enough to perform the transaction if there is not enough funds the sender is sent a message.

Your current balance is insufficient to complete the transaction

It then checks the recipient account number whether it exists. If it does not exist the sender receives the message below.

Recipient account does not exist

If the details for the details for the transaction are correct, the software does the crediting of the recipient's account and a message that notifies the sender of the transaction that was made and the current balance is sent to the sender, which is below.

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Transaction Completed, your new account balance is [balance]

iv) Changing of pin code:

The pin code of an account can be changed if the account owner wishes to change it. The person has to send a message in this format.

CHANGE PIN [accountnumber] [oldpin] [newpin]

The sender is notified of the change, and he/she receives a message that says

Pin code successfully changed

Statement checking: check the statements for one or more accounts

Payments: pay for water, electricity, phone or internet invoices

Request checks: request check books

Mobile phone recharging: recharge the mobile phone

Stock market operations: perform all types of stock market operations

Credit card operations: pay for credit card debts

Database Design

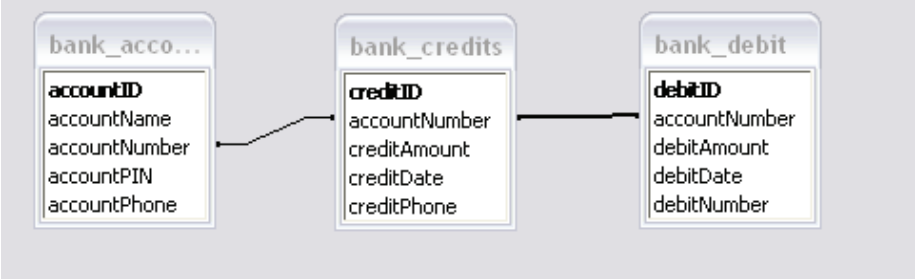

Figure 2: Tables for SMS Banking

My SQL Database is used to store banking information by the agent. It uses three tables for SMS Banking (Figure 2). The tables are:

Bank Account: This stores the customer information such as account name, account number, phone number and pin

Bank Credits: This is used to manage credits for a customer, it is related to the bank account table by the account number field, and hence the foreign key is the account number,

Bank Debits: Stores information about debits for a customer, it is also related to the bank account table by the account number field.

Advantages and Limitations of SMS Banking

Advantages:

1. **Convenience** – SMS banking offers a whole lot of convenience to its users, it enables users to perform most banking transactions at their own time, in SMS Banking, there is no such thing as standing in a queue.

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2. **Accessibility** – The user, can access his banking information, from anywhere, as long as he has network coverage on his mobile phone. In essence, SMS banking brings the information to the customer by bringing the customer to the information.
3. **Portability** – Unlike a lot of software applications such as J2ME Midlets which are platform dependent, SMS Banking can be done from any GSM phone as all GSM phones support SMS.
4. **Saves time** – SMS banking reduces the time required performing an average banking transaction; this is due to the automation of everything and the fact that there is no human intervention.
5. **Reduced Costs** – Relatively, SMS Banking reduces the costs of performing a banking transaction, Relatively Lower Cost of accessing information
6. **Less human resources required** - Automatic processing of clients request

Limitations

1. As a rule, length of a SMS message is 160 characters. This is a limitation in SMS technology. Therefore the messages are abbreviated depending on the availability of the space (Seylan Bank, n.d.).
2. the SMS technology (like email) does not guarantee set transmission times or guaranteed delivery of the message, therefore some messages may be delayed, blocked or lost
3. the cost of the message is transferred to the sender, is based on the number of messages being sent and is network dependent, although possibilities exist in reimbursing such cost and operating volume based tariffs
4. not all networks have full coverage and some locations may be protected for electromagnetic radiation, therefore not all users may be capable of getting a signal
5. not all users may have a mobile phone, therefore alternative back-up needs to be sought
6. delay of transmission of SMS by the GSM operators and intra and inter connection delays and traffics between GSM operators

Conclusion

It is obvious that SMS banking is the future of banking technology and SMS banking would play an important role in the creation of a cashless economy, what is left is for us to recognize this fact and utilize it.

Future Work

In the course of the work, we identified areas that we need to carry out further work. These areas are useful in the banking internal processes and how the SMS could be handled in the banking operations. The areas identified are the security and privacy of the SMS enabled transactions using the interactive Agents in transmitting the transactions.

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Biographies

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Ajayi Olutayo Bamidele graduated with B.Sc (Honours) degree in Mathematical Sciences (Computer science option) in 1991. He later obtained his M.Sc degree in Computer Sciences from the same institution. He had a postgraduate diploma in Petroleum Engineering from University of Ibadan, Ibadan in Nigeria. He is blessed with a wife and two kids.

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