

**DEVELOPMENT OF MOBILE PAYMENT
SYSTEM: AN IMPLEMENTATION OF CASHLESS
ECONOMY**

BY

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**BEING AN M.Sc. PROJECT REPORT SUBMITTED IN
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JUNE, 2014.

APPROVAL PAGE

This project report is approved for submission

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CERTIFICATION

I hereby declare that the work presented herein was done by me and not by a third party. Should I be convicted of having cheated in this work, I shall accept the verdict of the university.

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DEDICATION

This work is dedicated to my husband (my Cherish) and my lovely daughter,

Princess Juanita Olasinachi.

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I am grateful to my ebullient supervisor Dr. (Mrs.) M. N. Agu, for her guidance and whole-hearted co-operation throughout the duration of the project, and to all the lecturers in Computer Science department, for all the knowledge impacted in me during the course of this study.

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ABSTRACT

Cashless economy has ushered in the cashless banking framework across different countries of the world and this is made possible by the advances in information technology. Electronic cash is a term becoming more acceptable as the world makes a shift towards a cashless society. This research work presents the development of a mobile payment system which implements cashless economy. The main aim of this development is to reduce some cash-related crimes in our society such as: robberies, the risk of losing cash in the case of fire and flooding incidents, inefficiency and corruption associated with cash usage like leakages, money laundering, amongst other cash-related fraudulent activities. The mobile payment system developed produces services operated under financial regulation and performed from or via a mobile device. Instead of paying with cash or check, a consumer can use a mobile phone to pay for a wide range of services, digital or hard goods. This payment system is a service system where the consumer sends a payment request via an SMS text message to a short code, the merchant involved is informed of the payment success and can then release the goods paid for. AT commands for VB.Net programming language is the tool used in the development of this mobile payment system with Mysql as the database.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

Throughout the developing world, there is a strong focus on improving information technology. In this view, many believe that the use of information and communication technology (ICT) is a key that can help to address certain problems that required constant attention, like monitoring, controls, security and other commercial businesses. In the early 1940s, computers were used only for calculating and solving of trigonometric problems, as time went on, the use of computers extended to data processing applications, results oriented programs etc (Wikipedia). Today, Information Technology has advanced to the extent that it has made life more comfortable and efficient. The comfort of being able to pay for goods and services from any point of transaction, using **mobile payment system** has become a vital issue as it saves a lot of time and the risks involved in carrying cash.

Mobile phones can substitute for travel, allow quicker and easier access to information on prices, enable traders to reach wider markets, boost entrepreneurship and generally makes it easier to do business. Mobile phones have become devices for paying merchants, receiving time sensitive information such as stock quotes, and aid in critical business processes in many countries. Mobile Payment System (MPS) is an innovative application on the mobile phone platform that allows a person to initiate a transaction and make a payment using a mobile phone. MPS as an emerging payment system allows commercial transactions to be carried out anytime, anywhere and by anyone with a mobile phone which is a form of payment system that supports the emergence of

Cashless economy. Cashless economy is gaining more and more significance nowadays due to the widespread of Point Of Sale (POS) terminals in stores. This payment system is where paper money is replaced with electronic money which is facilitated with the advances in technology. As witnessed in the invention of the internet, the development of electronic account systems and the increasing sophistication in major industries all around the world, paper money (cash payment system) is becoming functionally less important as its functions are being reduced potentially and drastically.

Cash payment system is the popular form of payment with customers as transactions are completed immediately and it can also be used for another transaction, making them a cash-based economy. Payment with cash is simply using physical cash to make payments. This is the most common form of payment prevailing in most developing countries. The majority of African countries still have cash and cheque economies.

1.1 Statement of the Problem

According to Ovia (2002), Nigeria is largely a cash-based economy with large percentage of funds residing outside the banking sector as against the developed world, where the money in circulation is for example 4 percent in US and 9 percent in U.K. Whereas the cash-based economy is characterized by the psychology to physically hold and touch cash, a culture informed by ignorance, illiteracy, and lack of security consciousness and appreciation of the merit of digital payment.

There are so many problems observed that are associated with Nigerian's cash-based economy, which include:

- Delays in financial transactions which can be caused by queue in the bank or ATM to collect cash.
- Spread of bacteria through handling physical cash
- High rate of crime, illegal drug trade, terrorism, illegal immigration, human trafficking, corruption, due to its cash-based economy. People are always faced with the challenges of violent crimes (insecurity) such as, bank and ATM robberies, store holdups, armed robberies, employee cash theft, armor car heists, kidnap for ransom, and purse snatching as the system of physical cash been used is non-traceable, unaccountable, easy to hide or lose, steal, counterfeit and spend without a trace, as such paper cash has allowed all sorts of criminal activities to thrive.
- Too much cash in circulation which causes inflation to rise, and as inflation rises, it diminishes the purchasing power of consumers, making it undesirable to hold cash.

The use of Mobile Payment System can address these disadvantages associated with cash payment system.

1.2 Objectives of the Study

The Objective of this research work is to develop a prototype application to simulate the real world Mobile Payments applications that will help to:

- ❖ Make faster transactions ó reducing queues at the banks, ATM points and points of sales by eliminate time spent on collecting, counting and sorting cash.

- ❖ Improve hygiene on site ó eliminating the bacterial spread through handling of notes and coins.
- ❖ Help eliminate the crimes associated with the cash economy and improve the security consciousness of individuals and remove the common fear associated with using physical cash.
- ❖ Help check inflation by reducing the amount of cash in circulation.
- ❖ Enhance the Central Bank of Nigeria (CBN) new policy on cashless economy.

1.3 Significance of the Study

The study will foster the reduction of some disadvantages associated with cash-based economy to the government, banks, merchants and customers. It will seek to:

- Offer huge cost savings to the government because the use of Mobile payment system will reduce cost of printing paper currency.
- Obviate the need to transport, handle, store and dispense physical cash as mobile payment system will offer enormous savings to the banks and merchants
- Enable customers to conveniently pay for their goods and services without the inconveniences associates with withdrawing cash, especially those that are staying far from banks or ATMs stands.
- Provide more security to the business owners who will be saved from the stress of ensuring that they deposit the cash realized on daily basis in the bank due to the fear of financial loss in the case of fire, flooding incidents, armed robbery or domestic crisis.

- Also drive development and modernization of our payment system in line with Nigeria's vision 2020 goal of being amongst the top 20 economies by the year 2020. An efficient and modern payment system is positively correlated with economic development, and is a key enabler for economic growth.

1.4 Scope and Limitations of the Study

This research work is to develop a mobile payment system that can handle the payment for goods and services obtainable only in Nigeria. The project was left without certain limitations which include:

- i. The transaction must be made in a location where network signal (like GLO, MTN, etc) is available.
- ii. Because the cashless policy is a new system in Nigeria, the researcher encountered challenges in data collection.
- iii. Financial constraints posed a great challenge to the success of this project

CHAPTER TWO

LIRERATURE REVIEW

2.1 Payment System

Payment system is seen as a financial system supporting transfer of funds from suppliers (savers) to the users (borrowers), and from payers to the payee, usually through exchange of debits and credits among financial institutions. It consists of a paper-based mechanism for handling cheques and drafts, and a paperless mechanism (such as electronic funds transfer) for handling electronic commerce transactions. Also called payment mechanism (BusinessDictionary).

The payment system occupies an important place in the development of a country's economy; in fact the level of development of a country's payment system is a reflection of the state or condition of the country's economy. The concept 'payment system' has different meanings among writers. The definition ranges from a simple definition to a more complex definition. Below are different definitions of payment system from different authors:

Bruce (2012) defined payment system as an operational network - governed by laws, rules and standards - that links bank accounts and provides the functionality for monetary exchange using bank deposits.

According to Lacker (2005), payment system is referred to as the interbank settlement system, which is a contractual and operational arrangement that banks and other financial institutions use to transfer funds to each other.

Reserve Bank of Fiji sees payment system as systems that facilitate businesses and consumers to transfer funds to one another (www.reservebank.gov.fj).

According to Anyanwaokoro (1999), in the theory and policy of money and banking, payment system is defined as a system where settlement of financial obligations are done by the use of credit cards or even pressing some buttons that transfer the amount person through the computer.

Orjih (1999), defined payment system as a system which consists of different methods of payments which are cheques, credit cards, bankers drafts, standing order, documentary credits swift etc for the settlement of transactions.

Biago and Massimo, (2001) opined that payment system is the infrastructure (consisting of institutions, instruments, rules, procedures, standards, and technical means) established to effect the transfer of monetary value between parties discharging mutual obligations. Its technical efficiency determines the efficiency with which transaction money is used in the economy, and risk associated with its use. Payment systems are central to the growth of modern civilisations. Payment systems have evolved substantially over time, from earliest bartering systems, to systems based on coins of precious metal, to the virtual payment systems of today (Ferguson, 2008).

2.2 Different Types of Payment Systems

Over the years we have experienced a progression of value transfer a system starting from barter, through bank notes, payments orders, cheques, and later Credit Cards, this has finally evolved into Electronic payment systems which enables commerce on the Internet (Asokan, et. al. 2000).

Everyday people trade/exchange goods and services for money. With money being the major medium of exchange, payments systems were developed out of a need to facilitate growth of commerce and economic development. Payment systems may be physical or electronic and each has its own procedures and protocols. Standardisations have allowed some of these systems and networks to grow to a global scale, but there are still many country- and product-specific systems. Examples of payment systems that have become globally available are [credit card](#) and [automated teller machine](#) networks. Specific forms of payment systems are also used to settle [financial transactions](#) for products in the [equity markets](#), [bond markets](#), [currency markets](#), [futures markets](#), [derivatives markets](#), [options markets](#) and to [transfer funds](#) between [financial institutions](#) both domestically using [clearing](#) and [Real Time Gross Settlement](#) (RTGS) systems and internationally using the [SWIFT](#) network.

In this research work, different types of payment systems are discussed: what payment mechanisms are available in Nigeria and how they work. All payment systems in Nigeria are regulated and supervised by the Central Bank of Nigeria (CBN).

2.2.1 The Barter Payment System

Writing some years ago, Temple (1960) described barter as "the exchange of one article for another". Before the evolution of money, exchange was done on the basis of direct exchange of goods and services. This is known as barter. Barter involves the direct exchange of one good for some quantity of another good. For example, a horse may be exchanged for a cow, or 3 sheep or 4 goats. For a transaction to take place there must be a

double coincidence of wants. For instance, if the horse-owner wants a cow, he has to find out a person who not only possesses the cow but wants to exchange it with the horse. In other cases, goods are exchanged for services. A doctor may be paid in kind as payment for his services. For example, he may be paid a cock, or some wheat or rice or fruit. Thus a barter economy is a moneyless economy. It is also a simple economy where people produce goods either for self-consumption or for exchange with other goods which they want. Bartering was found in primitive societies. But it is the practiced at places where the use of money has not spread much. Such non-monetised areas are to be found in many rural areas of underdeveloped countries; adding that ðcurrency implies exchange through a mediumö (Kirk-Greene 1960).

2.2.1.1 Difficulties of the Barter System

The barter system is the most inconvenient method of exchange. It involves loss of much time and effort on the part of people in trying to exchange goods and services. As a method of exchange, the barter system has the following difficulties and disadvantages:

1. Lack of Double Coincidence of Wants: The functioning of the barter system requires a double coincidence of wants on the part of those who want to exchange goods or services. It is necessary for a person who wishes to trade his good or service to find some other person who is not only willing to buy his good or service, but also possesses that good which the former wants. For example suppose a person possesses a horse and wants to exchange it for a cow. In the barter system he has to find out a person who not only possesses a cow but also wants a horse. The existence of such a double coincidence of wants is a remote probability. For, it is a very *laborious and time-consuming* process to

find out person who want each other's goods. Often the horse-owner would have to carry through a number of intermediary transactions He might have to trade his horse for some sheep, sheep for some goats and goats for the cow he wants.

To be successful, the barter system involves *multilateral* transactions which are not matched exactly; no trade is possible under barter. This is the problem of finding someone who wants what you have to offer and who also has what you want. The yam farmer looking for a change of diet might try to find someone with plantains to offer, but having found such a person he might be disappointed to learn that he is not anxious to exchange his plantains for yam but instead wants some potatoes. Thus a barter system is time-consuming and is a great hindrance to the development and expansion of trade.

2. Lack of a Common Measure of Value: Another difficulty under the barter system relates to the lack of a common unit in which the value of goods and services should be measured. Even if the two persons who want each other's goods meet by coincidence, the problem arises as to the proportion in which the two goods should be exchanged. There being no common measure of value, the rate of exchange will be arbitrarily fixed according to the intensity of demand for each other's goods. Consequently, one party is at a disadvantage in the terms of trade between the two goods. The problem here is in fixing the relative values of the two commodities being bartered. For example, how many tubers of yams are equivalent to a bunch of plantains?

Moreover, under a barer system the value of each good is required to be stated in as many quantities as there are types and quantities of other goods and services. The exchange rate formula given by Prof. Culberston is $n(n-1)/2$ (Haruna, 2008). For example, if there are

100 different types of good in a barter economy, then there would be 4950 exchange rates for it to function smoothly, i.e. $100(100-1)/2 = 100 \times 99/2$ or $9900/2 = 4950$. This makes accounting an impossibility because a balance sheet would consist of a long physical inventory of the various types and qualities of goods owned and owed. Similarly, it is difficult to draw and interpret the profit and loss accounts of even a small shop. That is why the existence of the barter system is associated with a small primitive society confined to a local market.

3. Indivisibility of Certain Goods: The barter system is based on the exchange of goods with other goods. It is difficult to fix exchange rates for certain goods which are indivisible. Such indivisible goods pose a real problem under barter. A person may desire a horse and the other a sheep and both may be willing to trade. The former may demand more than four sheep for a horse but the other is not prepared to give five sheep and thus there is no exchange. If a sheep had been divisible, a payment of four and a half sheep for a horse might have been mutually satisfactory.

Similarly, if the man with the horse wants only two sheep, then how will he exchange his horse for two sheep. As it is not possible to divide his horse, no trade will be possible between the two persons. This is another problem of the barter system economy. There is no bias on which to equate one person's product for another person's product. For instance, a man wanting to exchange his table for only one bunch of plantains will not obtain any change as it is apparent that a bunch of plantains cannot be of the same value with a table. The barter economy apart from the above-mentioned draw-backs, the system is a slow and an inefficient way of trading especially in a progressive economy.

The third stage is the indirect production system using money as a medium of exchange between all other commodities. This system overcomes the inherent problems in barter economy. The indirect production of goods and services has been carried to a higher degree which enables people to specialize in those jobs they are best suited for. As a reward for the job performed by each person, money is paid at the end of month. Thus indivisibility of certain goods makes the barter system inoperative.

4. Difficulty in Storing Value. Under the barter system it is difficult to store value. Anyone wanting to save real capital over a long period would be faced with the difficulty that during the intervening period the stored commodity may become obsolete or deteriorate in value. As people trade in cattle, grains, and other such perishable commodities, it is very expensive and often difficult to store and to prevent their deterioration and loss over the long period.

5. Difficulty in Making Deferred Payments: In a barter economy, it is difficult to make payments in the future. As payments are made in goods and services, debt contracts are not possible due to disagreements on the part of the two parties on the following reasons:

1. It would often invite controversy as to the quality of the goods or services to be repaid.
2. The two parties would often be unable to agree on the specific commodity to be used for repayment.
3. Both parties would run the risk that the commodity to be repaid would increase or decrease seriously in value over the duration of the contract. For example, wheat might rise markedly in value in terms of other commodities, to the debtor's regret,

or decrease markedly in value, to the H creditor's regret." Thus it is not possible to make just payments involving future contracts under the barter system.

6. Lack of Specialisation: Another difficulty of the barter system is that it is associated with a production system where each person is a jack-of-all trade. In other words, a high degree of specialization is difficult to achieve under the barter system. Specialization and interdependence in production is only possible in an expanded market system based on the money economy.

Thus no economic progress is possible in a barter economy due to lack of specialization.

2.2.2 Bank Coins and Notes (Cash) Payment System

Since the overcoming of barter in the history of mankind, trade usually involve the exchange of goods and services and an equivalent abstract value such as money. (Sadeghi & Schneider, 2001). Ever since money was invented as an abstract way of representing value, system for making payments have been in place.

A cash payment system is simply using physical cash (bank coins and notes) to make payments. This is the most common form of payment prevailing in Nigeria and most developing countries. The majority of African countries still have cash and cheque economies (Vinod, 2008). Cash is the popular form of payment with customers as transactions are completed immediately and it can also be used for another transaction.

According to Appolos (2012), what we know today as Nigerian currencies did not just begin with naira and kobo. When looked back at history, one could vividly recollect that before the introduction of the British currencies: Pounds, Shillings and Pence (between 1959-1973) which preceded the introduction of naira and kobo on 1st, January

1973, several local currencies were in use as means of trade and exchange. Thus, it was after the introduction of naira and kobo on 1/1/1973, the new denomination of the Nigeria's decimal currency notes the twenty naira (N20) bank note was introduced on 1/2/1977, being the highest denomination ever and first currency bank note to bear the portrait of a Nigerian citizen, the Late Head of State, General Murtala Mohammed. On 2/7/1979, N1, N5, and N10 notes were introduced. The N5 note has the portrait of Late Sir Abubakar Tafawa Balewa (First and only Prime Minister of Nigeria); while N10 note has the portrait of Late Alvan Ikoku (Educationist). On 12/4/1984, the colour of naira was changed save 50kobo note. On 27/8/1999 N50 note was introduced with pictorial representations of three ethnic groups WAZOBIA. Both 50 kobo and N1 notes were coined. On 1/12/1999, N100 note was introduced bearing the portrait of Late Chief Obafemi Awolowo (First Premier of Western Region). On 1/11/2000 N200 note was introduced bearing the portrait of Late Alhaji Ahmadu Bello (First and only Premier of Northern Region). On 1/4/2001, N500 note was introduced bearing the portrait of late Dr. Nnamdi Azikiwe (First and only Governor General of Nigeria). And on 28/2/2007, the size and colour of N5, N10, and N20 notes were changed and N2 coin for the first time was introduced.

The use of Coins and Bank Notes (cash) has been the preferred method for small payments because it involves less credit and therefore less promises. With cash, you can usually purchase goods and services easily as it widely accepted. Carrying too much cash is risky as it can lead to theft and other problems. However, people still carry cash for its convenience and flexibility. From the payee's point of view, transactions are completed

immediately and this cash can be re-used for other transactions. Also, people's reliance on cash can be partly attributed to the perceived instant purchasing power that cash gives them, and partly due to the fact that cash requires no authentication, as in the case of cheques and card payments where an authentication has to be carried out before a transaction is approved. There is also no transaction fee on cash payment, unlike cheques and card payment where a fee is charged by the bank that issued the card.

However, with the cash system, people stand a great risk of insecurity, such as theft or robbery, with the slim hope of retrieving that money back. This is one of the great disadvantages of a cash system. Also, too much cash in circulation causes inflation to rise, and as inflation rises, it diminishes the purchasing power of consumers, making it undesirable to hold cash.

2.2.3 Cheque Payment System

A cheque is an order to transfer funds from the payer's bank to the account of the payee. Cheques are generally valid for six months after the date of issue. The use of cheques has traditionally dominated Nigerian non cash payments. Despite the development of other payment instruments, cheques remain an important form of payment. A cheque is effectively a future promise to pay the amount stated on it and needs to be presented to a bank in order to obtain the payment.

According to Probert Encyclopedia, a cheque payment system is a type of payment made by a bill or draft on a bank, payable on presentation. Unlike cash system, where physical money is used for making payment, with the cheque system a person can issue a cheque as a form of currency for payments which is withdrawn from a bank.

Recent developments in the cheque payment system, such as the introduction of Cheque Codeline Truncation by the Bank of Nigeria, is to ensure easy clearance of cheques, thus reducing the long period used to clear cheques at the banks. Even though, the cheque system sounds organized, as it involves the use of banks as the point of collection and is safer than cash, and it is evolving as there are on-going developments in the cheque system. The use of cheque payment system is convenient ó easy to carry around, it is safe/secure, safer than cash e.g. a crossed cheque can only be deposited into the payee's account. This payment system also has some level of peace ó use of post dated cheque to offset debt, preferable for large amounts and a large number of payments to avoid carrying large sums of cash. Payments can be made at your convenience and posted to the payee.

Just as the cash system, there are also various risks or disadvantages associated with the use of cheques. The numerous limitations associated with the cheque system include, forgery of signature, rejection - fake/bounced cheques, there is no guarantee that the payer has sufficient funds and hence the cheque may become dishonored (bounce) by the bank. There is always demand for specific ID cards that are not universal ó drivers license, international passport, national ID card, etc. there can also be delays in cheque clearing ó long clearing days/processing time. There are Charges attracted by cheque payment system, Cheques have administrative costs associated to it. Insufficient bank networks can be faced in small towns and villages.

2.2.4 Card Payment System

A card payment system is the use of a plastic card that contains a Personal Identification Number (PIN) that is linked to one's account that can be used to withdraw money from the appropriate terminal. Most cards have a magnetic stripe on which data is stored, and has a Card Verification Value (CVV), which is used to verify the genuineness of the card. The existing card payments globally include: credit cards, debit cards, and smart cards.

Credit card payment system is a type of payment process that enables its holder to buy goods and services with a credit line given by credit card issuer. Funds are settled at a later date. Card holders are billed on a monthly basis and bear financial charges (interest) on outstanding amounts if payments are not made by the due date. Credit cards are issued through commercial banks and/or other issuers. The advantages associated with credit card payment system include: guaranteed payment up to an approved limit and it can be used for mail order and online purchases. While the challenges associated with this type of payment system include: payment of fee to the bank for this service, high interest rates make credit cards an expensive mode of borrowing, theft if the card is stolen or if internet payment sites are not secure, etc.

The debit card payment also works similarly to the credit card, with the difference being that payments are directly deducted from the card holder's account, instead of a credit line. An ATM card (also known as bank card, client card, key card, or cash card) is an example of a debit card, this payment card is provided by a financial institution to its customers which enables the customer to use an automated teller machine (ATM) for

transactions such as: deposits, cash withdrawal, obtaining account information, paying bills and other types of banking transactions, often through interbank networks (Jarunee W. 2005). The use of ATM cards require authentication through a personal identification number (PIN), access of fund via ATM card is PIN based.

It can also be used on improvised ATMs, such as merchant's card terminals that deliver ATM features without any cash drawer (commonly referred to as a mini ATMs). These terminals can also be used as Cashless script ATMs by cashing the fund transfer receipt at the merchant's Cashier. ATM card payment system is fast, Convenient ó urbanites, Accessible ó 24 hours a day, 7 days a week, 365 days a year, Easy to use (some urbanites), Interbank usage ó ATM card from one bank can be used on another bank's ATM stand, Receipt of clean Naira notes. The use of ATM card has several disadvantages which may include: fraud - very easy to hack, limited geographic spread of financial institutions in small towns and villages, increasing number of scammers (phishing), network fluctuations, lack of adequate cash especially over the weekend, Card jam/retention issues, lack of control/personal spending, Loss of money/robbery after usage of ATM, lack of adequate security around the machines.

2.2.5 Electronic Payment System

Electronic payment, popularly known as e-money, is a payment platform where users pay money in advance into their e-money account or create an e-money account that is linked to their credit card or bank account. An example of this is PayPal, which allows users to create an account by filling in a form on their website and providing their credit card or bank account details, from which money will be drawn for payments. This

payment system makes more use of computer networks and internet access. Card and electronic payment systems have certain advantages when compared to cash and cheque payment systems. For instance, unlike the cash payment system, where once the physical cash is stolen one's hope of getting that money back is minimal, with a card payment system, there is greater amount of security. Visa or MasterCard for instance have authentication and authorization features such as a card number, a CVV and a secured PIN. The PIN is only known to the card owner, so in the case where the card is stolen, it will be difficult for an unauthorized person to withdraw money. With the biometric card, where the card owner's finger- print is embedded into the system, without which a transaction cannot be approved, gives a high level of security and trust among its users.

However, one of the limitations of the card payment system is that to withdraw money or to make payment, one has to look for the appropriate terminal, such as an ATM or a POS before their transaction can be effected. This is a disadvantage, especially in a situation where there are not many ATMs deployed, or where the ATMs machines are out of service.

2.2.5.1 Development of Electronic Banking in Nigeria

Kaleem & Ahmad (2008) observed that Electronic banking is the latest in the series of technological wonders of the recent past and that ATMs, Tele-banking, Internet Banking, Credit Cards and Debit Cards have emerged as effective delivery channels for traditional banking products. The Government of Nigeria further promoted electronic banking with the CBN release on August 2003. This recognizes that electronic banking and payments services are still at the early stages of development in Nigeria. Arising from the three

major roles of the CBN in the areas of monetary policy, financial system stability and payments system oversight, the CBN Technical Committee on E-Banking has produced a report, which anticipates the likely impact of the movement towards electronic banking and payments on the achievement of CBN's core objectives. Following from the findings and recommendations of the Committee, four categories of guidelines have been developed as follows:

- Information and Communications Technology (ICT) standards, to address issues relating to technology solutions deployed, and ensure that they meet the needs of consumers, the economy and international best practice in the areas of communication, hardware, software and security.
- Monetary Policy, to address issues relating to how increased usage of Internet banking and electronic payments delivery channels would affect the achievement of CBN's monetary policy objectives.
- Legal guidelines to address issues on banking regulations and consumer rights protection.
- Regulatory and Supervisory, to address issues that, though peculiar to payments system in general, may be amplified by the use of electronic media.

The Guidelines are expected to inform the future conduct of financial institutions in electronic banking and electronic payments delivery. This landmark step provided legal recognition of digital signatures and documents, thus reducing the risks associated with the use of electronic banking in Nigeria. At present almost all the commercial banks

in Nigeria have set up their own ATM Networks, issue debit and credit cards and have joined ATM switch Network (Ovia 2002; Ayo, Ekong, Fatudimu and Adebisi, 2008).

According to Somoye (2008), between 1952-1978, the banking sector recorded forty five (45) banks with varying minimum paid-up capital for merchant and commercial banks. The number of banks increased to fifty-four (54) from 1979-1987. The number of banks rose to one hundred and twelve (112) from 1988 to 1996 with substantial varying increase in the minimum capital. The number of banks dropped to one hundred and ten (110) with another increase in minimum paid-up capital and finally dropped from 89 as at end of 2003 to twenty-five in 2006 with a big increase in minimum paid-up from two billion naira in January 2004 to twenty five billions in July 2004. As at the end of 2010 the number of banks licensed to practise in Nigeria stood at 24 (www.cbn.ng 2011).

2.2.5.2 Benefits of Electronic Banking

The perceived benefits of electronic banking have been documented in recent studies, especially. Several electronic distribution channels available for banks in United States were compared and concluded that customer orientations towards convenience, service, technology, change, knowledge about computing and the Internet affected the usage of different channels. Howcroft, Hamilton, & Hewer (2002), found that the most important factors encouraging consumers to use online banking are lower fees followed by reducing paper work and human error, which subsequently minimize disputes. Byers and Lederer, (2001) concluded that it was changing consumer attitudes rather than bank cost structures that determines the changes in distribution channels; they added that

virtual banks can only be profitable when the segment that prefers electronic media is approximately twice the size of the segment preferring street banks. Convenience of conducting banking outside the branch official opening hours has been found significant in cases of adoption. Banks provide customers convenient, inexpensive access to the bank 24 hours a day and seven days a week. Moutinho et al., (1997) pointed out that each ATM could carry out the same, essentially routine, transactions as do human tellers in branch offices, but at half the cost and with a four-to-one advantage in productivity.

Agboola (2006) observed that some payments are now being automated and absolute volume of cash transactions have declined under the impact of electronic transaction brought about by the adoption of ICT to the payment system especially in the developed countries. Emmanuel and Sife (2008) observed that positive effects of ICT have continually been noted in business, production, education, politics, governance, culture and other aspect of human life. This view is corroborated by Agboola (2006) and Ayo (2006) that the growing rate of ICT particularly the internet has influenced at an exponential rate, on line interaction and communication among the generality of the populace.

In the Research Journal of Finance and Accounting highlighting the impact of ICT in recent years, Rao, Metts and Mong (2003) observed that the 1990s witness the proliferation and hyper growth of internet and internet technologies, which together are creating a global and cost-effective platform for business to communicate and conduct commerce. Oladejo and Dada (2008) investigated the impact of IT on the performance of Insurance companies in Nigeria. Ayo, et al (2007) conducted an investigation on the level

of adoption of ICT in the Nigerian banking sector using SWOT analysis. It was found that all banks in Nigeria offer e-banking services and about 52% of them offer some forms of other on line banking services. They agreed with fact that Nigeria was the fastest growing telecoms nation in Africa and the third of the world. The country had experienced a phenomenal growth from a teledensity of 0.49 in 2000 to 25.22 in 2007. This trend had brought about a monumental development in the major sector of the economy, such as banking, telecoms and commerce in general. They concluded that all the 25 banks in Nigeria engaged the use of ICT as a platform for effective and efficient delivery of banking services such as electronic payment cards with internet banking and mobile banking services gradually being introduced. Literatures indicate the movement away from cash transactions (Ovia 2001, Patric et al 2008) and in words of Agboola, (2006) the use of non-cash payment has continued to rise with increasing value. Tellers are today equipped to issue receipts (deposit slips) for cash deposits the service of ordering bank draft of certified cheques made payable to third parties has also been increasingly automated (Ovia 1998; Irechukwu 2000). Oladejo et al (2008) investigated the impact of information technology on insurance firm services in Nigeria. Using non-parametric statistics (Chisquare) in testing the hypothesis formulated, the study concludes that the recent observed upsurge effectiveness and efficiency in the insurance industry in Nigeria is attributable to their high investment in information technology.

Gerrard et al (2003) found a positive correlation between convenience and online banking and remarked that a primary benefit for the bank is cost saving and for the consumers a primary benefits is convenience. Multi-functionality of an IT based services

may be another feature that satisfies customer needs (Gerson, 1998). A reduction in the percentage of customers visiting banks with an increase in alternative channels of distribution will also minimize the queues in the branches as averred Thornton et al, (2001). Increased availability and accessibility of more self-service distribution channels helps bank administration in reducing the expensive branch network and its associate staff overheads. Bank employees and office space that are released in this way may be used for some other profitable ventures (Birch and Young, 1997).

Yakhlef (2001) pointed out that banks are responding to the Internet differently, and that those which see the Internet as a complement and substitute to traditional channels achieved better communication and interactivity with customers. Robinson (2000) argued that the online banking extends the relationship with the customers through providing financial services right into the home or office of customers. The banks may also enjoy the benefits in terms of increased customers loyalty and satisfaction (Oumlil et al, 2000). However, Nancy et al (2001), viewed the same situation differently and argued that customers like to interact with humans rather than machines. They found more possibilities for asking questions and believe that bank clerks are less prone to errors. It is thus essential that any face-to-face transactions are carried out efficiently and courteously. This increases the possibility of selling the customer another service that they need and also promotes a good image and enhances customer loyalty (Moutinho et al., 1997).

Kaleem and Ahmad, (2008) investigated bank employees' perceptions of the potential benefits and risks associated with electronic banking in Pakistan. Primary

sources were used to collect the data and were analyzed via frequency analysis and mean score analysis. The results suggest that bankers in Pakistan perceive electronic banking as tool for minimizing inconvenience, reducing transaction costs and saving time. Polatoglu and Ekin, (2001) found that low levels of email usage and a preference for doing over-the-counter transactions at bank branches are the main reasons for not using e-banking in Turkey.

2.3 Mobile Payment System

A mobile payment is any payment where a mobile device is used to initiate, authorize and confirm a transfer of value in return for goods and services (Pousttchi, 2003; Au and Kauffman, 2008). Mobile payments emerged in the 2000s, with early successes in the sale of mobile content and services such as ring tones and logos. Later, mobile payments were suggested as an alternative for micro-payments at point-of-sales systems, where the use of cash had been declining for many years.

Mobile payment system consists of using mobile devices such as Mobile Phone, PDA, Wireless Tablet and Other devices connected to a Mobile Telecommunication Network, to initiate a transaction, such as a purchase request, and finalizing that transaction by authorizing payments for the exchange of goods and services. This makes mobile payment system a form of electronic payment, with the exception that the transactions are carried out on the mobile phone. Instead of paying using cash, cheques or credit/debit cards, a person can use his/her mobile phone to make payments. The mobile phone is capable of providing a bridge between the traditional and the new payment systems, supporting on demand purchase and payment processes in a manner heretofore

not conceivable. The transition to mobile phone driven payment processes is not smooth, however, not because of a lack of technology innovation, but because the underlying players in the industry are reluctant to change their existing business models. Banks and their customers are not in agreement as to what constitutes good value in terms of payment alternatives, a phenomenon also found among stakeholders to technology adoption (Au and Kauffman, 2008). Research has suggested that the high failure rate of mobile payment solutions is linked to their inability to provide the right value proposition to customers (Ondrus, Camponovo and Pigneur, 2005). Banks promote payment instruments that earn them most revenue. These tend to be centralised and inconvenient. Customers have little choice in selecting payment instruments, but are being seduced by the control and convenience of on-line and mobile payment solutions, which provide flexibility and convenience. Until a solid value proposition emerges that combines value for both banks and customers, the innovation in terms of payment solutions will remain sporadic and piecemeal. This paper explores the existing research domains from which such value propositions or business models could be drawn, and extrapolates a theoretical basis for further research in the area of payments.

The challenge of understanding the driving forces in the market for mobile payment system is that there are an accelerating range of solutions that address shortcomings in legacy payment processes. For example, many innovative solutions support the connection of existing bank or credit card accounts to on-line virtual wallet transactions, substituting the phone for the desktop computer but without changing the underlying value proposition (Olsen, Hedman and Vatrapu, 2011). Other solutions

leveraging the processing capability of Smart phones seek to associate the payment transaction with other customer related processes such as loyalty points programmes, but are by definition focused on a particular segment of Smart phone using consumers. While such developments espouse key technology adoption factors such as consumer convenience and ease of use, they also tend to obscure visibility of the comparative value of choosing a particular payment instrument over an alternative. The language used for describing payments has relied on traditional banking terminology such as payment instruments, or on technological concepts such as connectivity. There are many other possible dimensions for describing payments such as transaction type, payment domains or geographic scope. Indeed one of the difficulties for the development of an ecosystem for mobile payments has been the lack of a common vocabulary between the financial services community and the technology service community. The method used in this study is to categorise the concepts used to describe mobile payments, and map these 'technological' categories against factors describing the business setting of procurement and settlement, thereby allowing us to effectively accumulate knowledge, and to interpret previous findings (Dahlberg, Mallat, Ondrus and Zmijewska, 2008).

According to Schwiderski-Grosche and Knospe (2009), mobile payment system mode of operation can be described in four models, namely: SMS, Direct Mobile Billing, Mobile Web Payment (WAP), and Contactless Near Field Communication (NFC).

Mobile payment system as an SMS operation, to make payment, a consumer has to send their request in a form of text through an SMS to a short code or to a particular

number (this number being the merchant's or the other recipient's number), the recipient will then be informed about the payment's success and then finalize the transaction.

The Direct Billing operation of mobile payment system does not require the linkage of a credit/debit card or bank account to the mobile payment system account, It is simply using the direct billing option, where the Mobile Network Operator acts as an mobile payment system service provider as well. A person on the Direct Billing option is billed periodically for mobile payment system transactions initiated, as part of the service bill. This option uses a two-factor authentication to make purchases. The two-factor authentication used here are: a PIN and a onetime Password.

As an application developed in programming languages such as Visual Basic.Net, Java 2nd Micro Edition (J2ME), Python or Wireless Application Protocol (WAP), mobile payment system transactions are initiated through an interface application with a walk-through menu from which the appropriate transaction type is selected. This requires the creation of a virtual currency account that is linked to the sources of finance of the consumer such as a bank account, credit card and virtual-money through a vouchers upload. A list of types of transaction is also provided in the menu from which a user must select one before authorizing a transaction.

As an NFC application, a user uses a mobile phone equipped with a smartcard or a microchip that is embedded in the phone, and waves his/her phone near a reader module, such as a credit card scanner to make payment. Most transactions do not require authentication, but some require authentication using PIN, before a transaction is completed.

2.3.1 Adoption of Mobile Payments

Modern trends indicate that electronic payment systems have become a significant element in all trade and commerce activities globally. The scope of electronic payments extends from under one dollar to Multi-Million dollar transactions. Despite the benefits that electronic payment systems has brought to other economies such as the western developed countries, economies in Africa, which are still in the early stages of applying electronic payment systems are yet to experience its maximum economic and operational impact. (Ackorlie, 2009).

A mobile payment is any payment where a mobile device is used to initiate, authorize and confirm a transfer of value in return for goods and services (Pousttchi, 2003; Au and Kauffman, 2008). Mobile payments emerged in the 2000s, with early successes in the sale of mobile content and services such as ring tones and logos. Later, mobile payments were suggested as an alternative for micro-payments at point-of-sales systems, where the use of cash had been declining for many years. Many mobile and electronic payment solutions have been introduced ever since, but most of them have failed or have had a low penetration rate (Mallat, 2007; Dahlberg, Mallat, Ondrus and Zmijewska, 2008). The "chicken and egg" situation for emerging payment models means that enough merchants need to be on-board with any new solution for it to catch on with consumers, but in order to be appealing to merchants there must be a critical mass of consumers interested. Lee, Warkentin and Choi (2004) refer to mobile payment *liquidity* as the extent to which it is accepted by sellers and therefore adopted by customers. Au and Kauffman (2008) refer to the theory of network externalities to explain value creation

in the networked economy, suggesting that the value of such services to banks and their customers will increase as the network grows. One such failure is the Dancoin (our translation) in Denmark, which did not reach critical mass of users, either payers or merchants. Standardisation and technology maturity have equally been highlighted as key requirements for expansion of mobile payments (Mallat, Rossi and Tuunainen, 2004; Lee Lee, Warkentin and Choi, 2004). So, while the most popular payment instruments are still cash, debit and credit cards, with smart cards being the most serious challenger to traditional cash, the ways to make contactless payments and especially mobile payments are increasing. When looking into the future, companies and experts agree that the mobile phone is the technical device that they will try to turn into the new wallet, mainly because of the diffusion of mobile phones, which no other technical device can match, but also due to the fact that most of us carry our mobile phones with us most of the time (Olsen, Hedman and Vatrappu, 2011). If the mobile phone as e-wallet succeeds it will very likely be at the expense of traditional payment instruments. But it is also a possibility that the mobile wallet will simply become a new way of entering the current card and account-based payment services (Dahlberg, Mallat, Ondrus and Zmijewska, 2008).

Contini, Crowe, Merritt, Oliver and Mott, (2011) describe the mobile ecosystem as a complex set of interconnected entities and relationships which interact to form a stable functioning payments system, with participants including financial institutions, money service providers, handset makers, technology service providers, mobile network operators, mobile virtual network operators, merchants and consumers. Internationally, national governments have individually pledged support to developing electronic

payment capabilities as part of the broader adoption of e-Government capabilities, while in Europe, much of this development has been driven by the establishment of SEPA (Single Euro Payments Area). At the same time the European competition agency tends to inhibit banks collaborating on new payment solutions, since this might be perceived as creating barriers to trade.

Understanding the importance of these emerging solutions is the key motivation for developing an integration framework for mobile payments. Webster and Watson, (2002) described how theory in the Information system field evolves from ad-hoc classification systems through taxonomies to conceptual frameworks. There is a need for a robust analysis framework to abstract meaning from the myriad technology offerings, and indeed to differentiate between business value and technology capability (Kauffman and Walden, 2001; Au and Kauffman, 2008). Practitioners and academics require an abstracted view of the business requirements and their solutions in order to design lasting solutions. The next section outlines the dimensions that can be used to build this abstracted view.

2.3.2 Classifying the Dimensions of Mobile Payments

Mobile payment solutions may be described by a number of attributes that relate either to the process or the technology of making a payment. The process dimension refers to *what* type of payment is being made, and crucially should include the notion of customer value. The technology dimensions describe *how* a payment process works, and typically involves the integration of a number of physical and virtual payment instruments.

2.3.2.1 The Value Dimension

The value dimension, described as a market perspective by Ondrus, Camponovo and Pigneur, (2005), or as a *value taker* perspective by Kauffman and Walden (2001), relates to both customer benefits and needs respectively. Ondrus, Camponovo and Pigneur, (2005) suggested that it is the failure to address the demand issues that undermine many payment service offerings. It is therefore suggested that the customer demand (value) dimension be used to characterise mobile payments. This dimension will calibrate customer value across a ðconsumer to merchant axisö (Ondrus, Camponovo and Pigneur, 2005; Dahlberg, Mallat, Ondrus and Zmijewska, 2007). Clearly the time and location independence afforded by the mobile phone user is an advantage (Mallat, 2007; Kim, Mirsobit and Lee, 2010). Indeed the ðanytime, anywhereö accessibility of mobile phones increases merchant access to location specific consumers, thereby potentially instigating demand and increasing sales opportunities, but not necessarily creating customer value. Customer value, for example, might be providing the payer with visibility of, and direct access to, alternative payment execution options, as well as related decision support information such as account balances, loyalty points, discounts and special terms. The customer value here is created through the *information* value as distinct from the *mobility* value (Gumpp and Pousttchi, 2005).

All businesses have payment processes for overhead expenditure related to personnel (payroll, tax and expenses), rent, maintenance, catering or hygiene services. Utility payments could be considered to include energy supply, refuse services, tax, banking services, digital network services and digital content. Transportation related

services include local transit tickets, parking, automobile taxation, and fuel, holiday, and airline payments. Consumer goods might include white goods, electronic equipment, computer equipment, clothing and furniture. Leisure and entertainment payments include cinema tickets, concert and event ticketing, use of sports facilities, vending machines and access to public amenities. Digital content includes phone credit, digital media (music, video, newspapers, and books), gift vouchers and virtual gaming products. Person to person (P2P) payments might include payments to tradespeople, babysitters, and home-helpers, local and cross border remittances, micro-payments and micro-finance. Charity or fundraising donations constitute a section of 'person to non-profit' organisation payments (P2NP). Social and Government payments include welfare, pension and health payments (G2C). On the other hand, the context of the payment also distinguishes the location of the payment and the actors involved. For example, payments may be made from a mobile phone at a point of sale, from a mobile phone remotely, in person at a bank branch, in person at an ATM or payment kiosk, in person at a post office or credit union branch. Payments may be sent by post, or made over the phone, via a digital TV service, or through a gaming or digital content interface such as iTunes. Bill payment services may be made on-line or via physical points of sale such as PayZone and PayPoint. On-line payments may be made via electronic wallets such as PayPal or Boku. Economic definitions of commercial actors include shareholders, debtors, creditors, managers, employees, community and government (Au and Kauffman, 2008). The purpose of this dimension is to understand where value is being consumed, and by whom.

2.3.2.2 The Integration Dimension

The second dimension for mobile payment attributes relates to the products, instruments or technologies through which the payments are executed. These attributes describe *how* the payment is processed, and are independent of either the transaction types or the payment channels discussed above. This virtualisation axis calibrates the extent to which payment execution has been mobilised using information technology (Gummp and Pousttchi, 2005). Technology or product related aspects of the mobile payments landscape are more *öinwardö* looking, defining customer *value making*, as distinct from *value taking*. Dahlberg, Mallat, Ondrus and Zmijewska, (2008) opined that this corresponds to the service provision (vertical axis) on the framework described by. The purpose of this dimension is to understand where value is being created, and by whom. The payment products include traditional physical instruments such as cash, cheques, coupons, pre-paid gift cards, postal orders and bank drafts. Credit transfer instruments include credit cards, debit cards, Electronic Funds Transfer, Direct Debits and Standing Orders. Mobile phone related instruments include bill to carrier account, bill to credit card account and bill to current account (ACH). Pre-loaded virtual instruments include electronic money accounts, virtual gift cards, and virtual loyalty cards. Payment authorisation options include signatures, passwords (on-line, SMS), PIN number, Chip, card user verification services, voice authorisation or biometric methods. The degree to which the payment is integrated into an enterprise or domain driven process defines an interface dimension including Buy-now, Accounts Receivable,

Accounts Payable, Payroll, Expense disbursement, Bank reconciliation or treasury management. Geographic scope for payments may include proximity, local, national, European or global. Payments across different currencies should include exchange rate calculations. The account types from which payments are drawn include unbanked customers, post office accounts, credit union accounts bank accounts (current, credit, deposit, savings), commercial or merchant accounts, e-Money accounts, Mobile Network Operator customer accounts, merchant loyalty account and digital media accounts. Account funding mechanisms include cash loading, SMS with top-up, Direct Debit, wire transfer, electronic funds transfer, credit transfer by SO/DD from third party bank account, remittances and on-line e-Money transfer. Device connectivity options include credit cards, such as Visa / Mastercard, debit cards, such as Maestro / Cirrus / Laser, Internet (TCP/IP, GPS, WiFi), Bluetooth and NFC. Clearing and settlement options include paper (e.g. IPCC), electronic (e.g. IREPCC), Credit Card and ATM. Timing of payment execution may be in advance, at moment of purchase, days or weeks after purchase.

2.4 The Cashless Economy

Woodford (2003) said contrary to what is suggestive of the term, cashless economy does not refer to an outright absence of cash transactions in the economic setting but one in which the amount of cash-based transactions are kept to the barest minimum. It is an economic system in which transactions are not done predominantly in exchange for actual cash. It is not also an economic system where goods and services are exchanged for goods and service (the barter system). It is an economic setting in which

goods and services are bought and paid for through electronic media. It is defined as òone in which there are assumed to be no transactions frictions that can be reduced through the use of money balances, and that accordingly provide a reason for holding such balances even when they earn rate of returnö.

In a cashless economy, how much cash in your wallet is practically irrelevant. You can pay for your purchases by any one of a plethora of credit cards or bank transfer (Roth 2010). Some aspects of the functioning of the cashless economy are enhanced by e-finance, e-money, e-brokering and e-exchanges. These all refer to how transactions and payments are effected in a cashless economy (Moses 2011).

According to Ezumba (2011), in Nigeria, under the cashless economy concept, the goal is to discourage cash transactions as much as possible. The CBN had set daily cumulative withdrawal and deposit limits of N150,000 for individuals and N1,000,000 for corporate entities (now reviewed to N500,000 and N3million respectively). Penalty fees of N100 and N200 respectively (now reduced to 5% and 3% respectively) are to be charged per extra N1000.

It should be said that as at now there are already some forms of cashless transactions that are taking place in Nigeria. It is noted that: Today there are up to seven different electronic payment channels in Nigeria, Automated Teller Machines (ATM), points of sales terminals, mobile voice, web, inter-bank branch and kiosks. E-payment initiatives in Nigeria have been undertaken by indigenous firms and have been stimulated by improvement in technology and infrastructure (Bababola 2008).

As noted above, the cashless economy does not imply an outright end to the circulation of cash (or money) in the economy but that of the operation of a banking system that keeps cash transactions to the barest minimum. The CBN had set daily limits of cumulative withdraws and lodgments of 150, 000 for individuals and 1,000,000 for corporate customers (now 500,000 and 3million respectively). The operation of the system does not mean the individual/corporations cannot hold cash in excess of 150,000/N1million (now 500,000/N3million respectively) respectively at any single point in time but that their cumulative cash transactions with the bank must not exceed these limits over a period of one day. The system is targeted at encouraging electronic means of making payments, and not aimed at discouraging cash holdings. This policy on limits implies that an individual can actually have 5,000,000 (more than 150,000 now 500,000) under his pillow at home, buys goods and services with them but must not pay more than 500,000 into his bank in one day without attracting a fine of 5% per 1000 for the excess. What is anticipated by this policy is that instead of making large withdrawals to effect payment for goods and services, such monies will be kept in the banking system so that payments are made through "credit card-like means." In this system users are issued with electronic cards which can be slotted into special electronic machines in order to effect payments. At the centre of such payment system are the Point of Sales (POS) terminals (Azeez 2011). These are to be deployed across commercial points in the country. These POS terminals thus deployed will serve like the Automatic Teller Machines (ATM). In this case, upon completing a transaction and the value ascertained, the amount is entered into a POS terminal into which the electronic card has been slotted. The cash equivalent

of the amount is transferred from the payer's account into the account of the payee automatically (Olaegbe 2011).

Users are issued with a card (the electronic purse). The electronic purse is topped up using revaluation terminals. There are different types of terminals: coin & note, credit card and payroll deduction terminals. The cards are simply inserted into the revaluation terminal and certain programmed instructions are followed, and money is added onto the electronic purse. This can then be used to pay for goods/services by inserting them into the POS terminals. When the card is inserted into the POS, and the transaction amount entered, the reader reads the amount and is quickly deducted from the e-purse (the card). According to Omore (2011), it has to be noted that the operation of the cashless economy (electronic payment) system is not entirely free. It is noted that: Curiously, using the POS comes with a hefty price tag of 1.25 percent of the cost of every purchase or transaction that is effected in addition to the 5 for every 1000 Commission on Turnover that our deposit money banks are allowed by CBN to charge every time money is taken from our account .

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

System analysis and design is the process of examining an existing system with the intention of improving it through better procedures and methods.

3.1 Analysis of the Existing Payment System

In Nigeria today, the popularly existing payment systems are using physical cash or cheques. Physical cash falls under the currency category of money or are called fiat money, while Cheques fall under fiduciary money or "demand deposits", also known as "checkbook money", which are the funds people hold in their checking or current account.

3.1.1 Payment System Using Physical Cash

A cash payment system is simply using physical cash to make payments, this payment system using physical cash involves only two actors, the payer and the payee physically exchanging the cash at the point of purchase of goods and services.

This is the most common form of payment prevailing in Nigeria and even most developing countries. The majority of African countries still have cash and cheque economies. Cash is the popular form of payment with customers as transactions are completed immediately and it can also be used for another transaction. Also, people's reliance on cash can be partly attributed to the perceived instant purchasing power that cash gives them, and partly due to the fact that cash requires no authentication, as in the

case of cheques payments where an authentication has to be carried out before a transaction is approved. There is also no transaction fee on cash payment, unlike cheque payment where a fee is charged by the bank that issued the cheque. However, with the cash system, people stand a great risk of insecurity, such as theft or robbery, with the slimmest hope of retrieving that money back. This is one of the great disadvantages of a cash system. Also, too much cash in circulation causes inflation to rise, and as inflation rises, it diminishes the purchasing power of consumers, making it undesirable to hold cash. The use of Mobile Payment System can address these disadvantages associated with cash payment system.

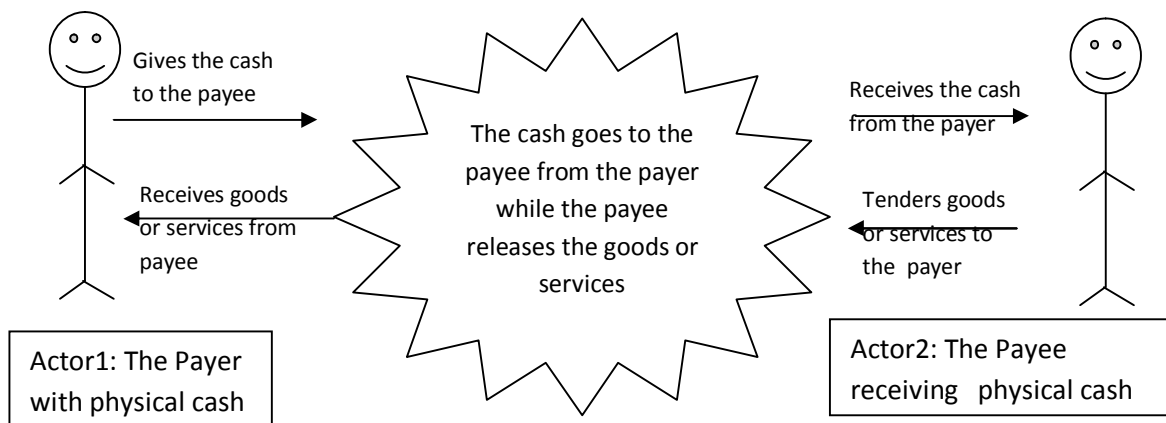


Fig 3.0: The Structure of physical cash payment system

3.1.2 Payment System Using Cheque

A cheque payment system is another popular type of payment made in Nigeria. This is a bill or draft on a bank, payable on presentation. Cheque payment system involves three actors: the payer, the payee and the bank. The bank makes checkbook

available for the payer, the payer writes a cheque of a certain amount and gives to the payee who in turn moves to the bank for clearance and cashing of the amount written on the checkbook.

Unlike cash system, where physical money is used for making payment, with the cheque system a person can issue a cheque as a form of currency for payments which is withdrawn from a bank. Recent developments in the cheque payment system, such as the introduction of Cheque Codeline, Truncation by the Bank of Nigeria, is to ensure easy clearance of cheques, thus reducing the long period used to clear cheques at the banks. Even though, the cheque system sounds organized, as it involves the use of banks as the point of collection and is safer than cash, and it is evolving as there are on-going developments in the cheque system. Just as the cash system, there are also various risks or disadvantages associated with the use of cheques.

The numerous limitations associated with the cheque system include, dishonoring of cheques (which makes it undesirable), forgery of signature, and many others. Over the years there have been numerous cases of cheques signature forgeries in Nigeria. It is worth mentioning that over the years there have been numerous conferences held by bankers, entrepreneurs and many others for an alternative payment system that is more flexible than cash and cheque ó a payment system that would lead to a òcashlessö and òchequelessö society.

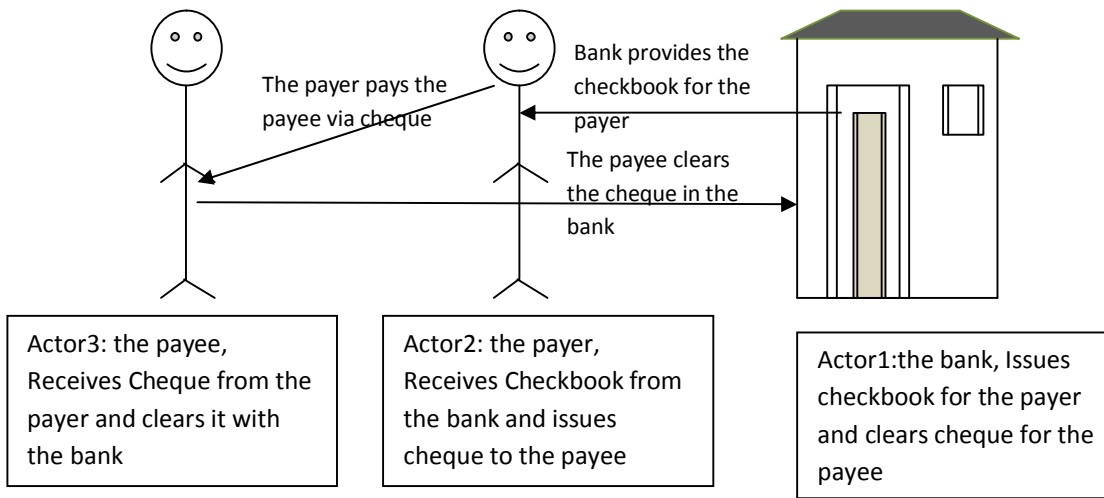


Fig 3.1: The Structure of cheque payment system

3.2 Analysis of the Proposed System

Analysis of the proposed system involves logical study of the various operations that will be performed by the proposed system and the relationships of the various operations within and outside of the proposed system. During analysis, data are gathered which is used for the analysis of the proposed. Once analysis is completed, the analyst has a firm understanding of what is to be done.

3.2.1 Data Gathering

This is a stage in software development where the system analyst gets the raw data for the system development. There are different methods of gathering data but for this research the following methods were used:

- ❖ Analysis/review of the old system: Here, the existing system was examine to find its component, how the component are connected to each other and how they work together in order to complete a transaction process by payment. The problems of existing system was also identified.
- ❖ The researcher also used the internet as source of information gathering. The researcher browsed the internet to gather necessary information from the existing system, its transaction procedure, actors involved and the challenges facing the existing system.

3.2.2 Methodology used for the Analysis

Methodology can be described as the method used to analyze the system with the aim of developing software for the system. The method used in analyzing this work is Object Oriented Analysis and Design (OOAD). Object Oriented Analysis (OOAD) is a model driven technique that integrates DATA and PROCESS concerns into constructs called objects. OOAD models are pictures that illustrate the system's objects from various perspectives such as structure and behavior. Object-oriented analysis and design (OOAD) is a popular technical approach to analyzing, designing an application, system, or business by applying the [object-oriented paradigm](#) and visual modeling throughout the [development life cycles](#) to foster better stakeholder communication and product quality.

The purpose of any analysis activity in the [software life-cycle](#) is to create a model of the system's functional requirements that is independent of implementation constraints.

The main difference between object-oriented analysis and other forms of analysis is that by the object-oriented approach we organize requirements around objects, which integrate both behaviors (processes) and states (data) modeled after real world objects that the system interacts with. In other or traditional analysis methodologies, the two aspects: processes and data are considered separately. For example, data may be modeled by [ER diagrams](#), and behaviors by [flow charts](#) or [structure charts](#).

The primary tasks in object-oriented analysis (OOA) are:

- Find the objects
- Organize the objects
- Describe how the objects interact
- Define the behavior of the objects
- Define the internals of the objects

Common models used in OOA are use cases and [object models](#) but the use case model is used in this work. [Use cases](#) describe scenarios for standard domain functions that the system must accomplish. Object models describe the names, class relations (e.g. Circle is a subclass of Shape), operations, and properties of the main objects. User-interface mockups or prototypes can also be created to help understanding.

Object-oriented modeling (OOM) is a common approach to modeling applications, systems, and business domains by using the object-oriented paradigm throughout the

entire [development life cycles](#). OOM is a main technique heavily used by both OOA and OOD activities in modern software engineering.

Object-oriented modeling typically divides into two aspects of work: the modeling of dynamic behaviors like business processes and [use cases](#), and the modeling of static structures like classes and components. OOA and OOD are the two distinct abstract levels (i.e. the analysis level and the design level) during OOM. The [Unified Modeling Language \(UML\)](#) and [SysML](#) are the two popular international standard languages used for object-oriented modeling.

The benefits of OOM are:

Efficient and effective communication

Users typically have difficulties in understanding comprehensive documents and programming language codes well. Visual model diagrams can be more understandable and can allow users and stakeholders to give developers feedbacks on the appropriate requirements and structure of the system. A key goal of the object-oriented approach is to decrease the "semantic gap" between the system and the real world, and to have the system be constructed using terminology that is almost the same as the stakeholders use in everyday business. Object-oriented modeling is an essential tool to facilitate this.

Useful and stable abstraction

Modeling helps coding. A goal of most modern software methodologies is to first address "what" questions and then address "how" questions, i.e. first determine the functionality the system is to provide without consideration of implementation constraints, and then consider how to make specific solutions to these abstract requirements, and refine them into detailed designs and codes by constraints such as technology and budget. Object-oriented modeling enables this by producing abstract and accessible descriptions of both system requirements and designs, i.e. *models* that define their essential structures and behaviors like processes and objects, which are important and valuable development assets with higher abstraction levels above concrete and complex source codes.

3.2.3 The Use case diagram of the system

A Use Case illustrates a unit of functionality provided by the system. The main purpose of the Use-Case diagram is to help development teams visualize the function of the system including the relationship of the *ACTORS* to essential processes, as well as the relationships among different use case. Mobile Payment System typically involves five main actors. These include a Financial Service Provider (FSP), a Payment Service Provider (PSP), a Mobile Network Operator (MNO), a payer and payee. An FSP is usually a bank and is responsible for performing the backend processing required for settling a transaction between two parties. A PSP facilitates the communication between the FSP and the payer/payee by providing the payment software. The MNO provides the infrastructure necessary for wireless WAN service. In addition, there are regulators who

are involved in monitoring compliance with the rules and laws related to m-payments. These are generally government bodies or law enforcement agencies. Security is of paramount importance in an e-payment system. Fig 3.2 shows the Use Case Diagram for a mobile payment system.

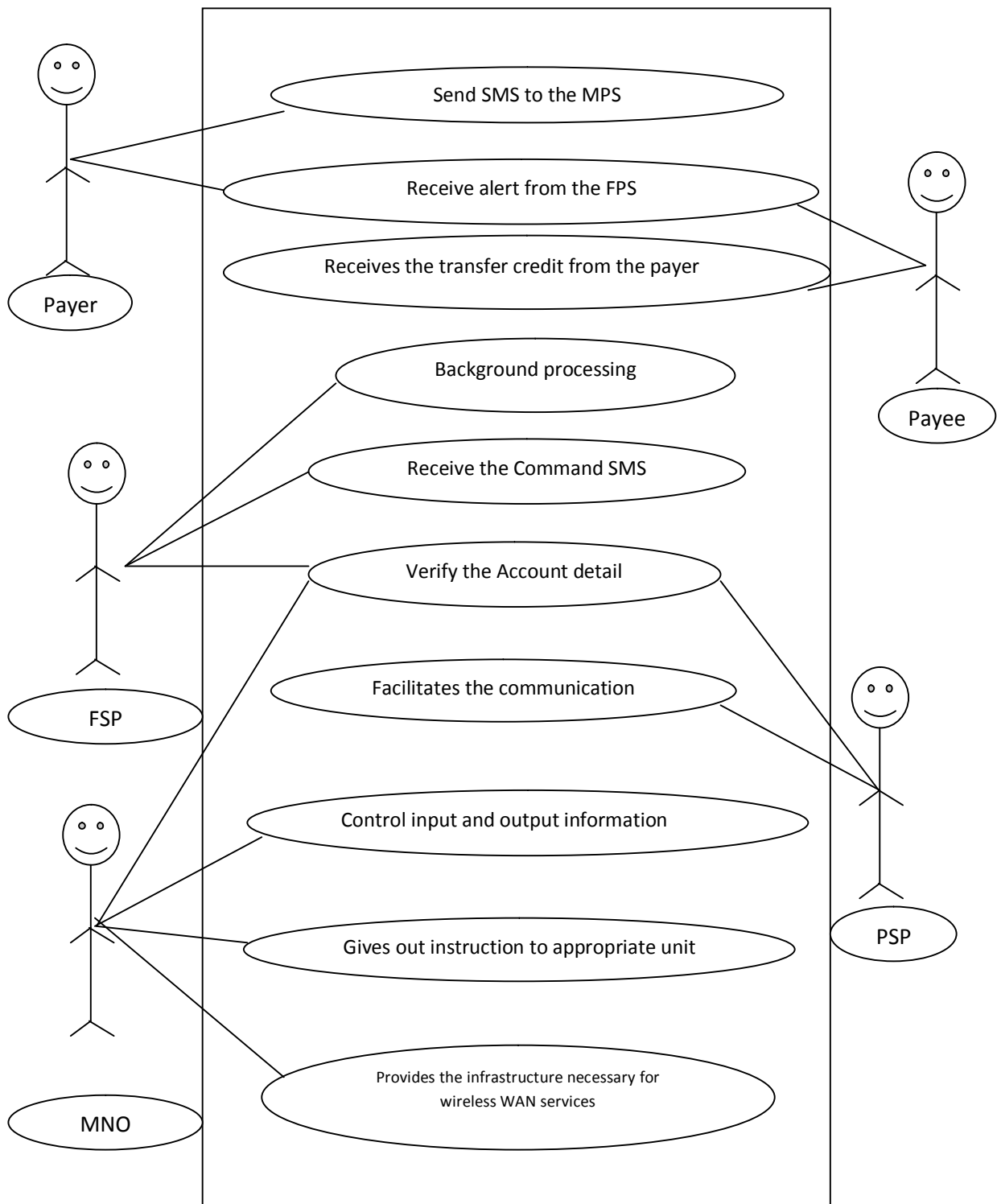


Fig. 3.2: USE CASE DIAGRAM OF MOBILE PAYMENT SYSTEM

3.2.4 State Chart Diagram

The state chart diagram defines the states of a component and these state changes are dynamic in nature, so its specific purpose is to define state changes triggered by events. It represents possible sequences of state change from a particular point of view. State chart Diagram are used to model states and also events operation on the system. When implementing a system it is very import to clarify different states of an object during its life time and state chart diagrams are used for this purpose. Therefore the main usage of state chart diagram is: To model object states of a system, to model reactive system, and to identify events responsible for state changes.

State chart diagram attributes are represented by:

- (a) Rounded rectangles labeled with their names.
- (b) The transition which is labeled with arrows connecting states.

A state is a condition of an object in which it performs some activity or waits for an event, while a transition is a relationship between two state which is triggered by some event, which performs certain actions. Fig 3.3 shows the state chart of the proposed system.

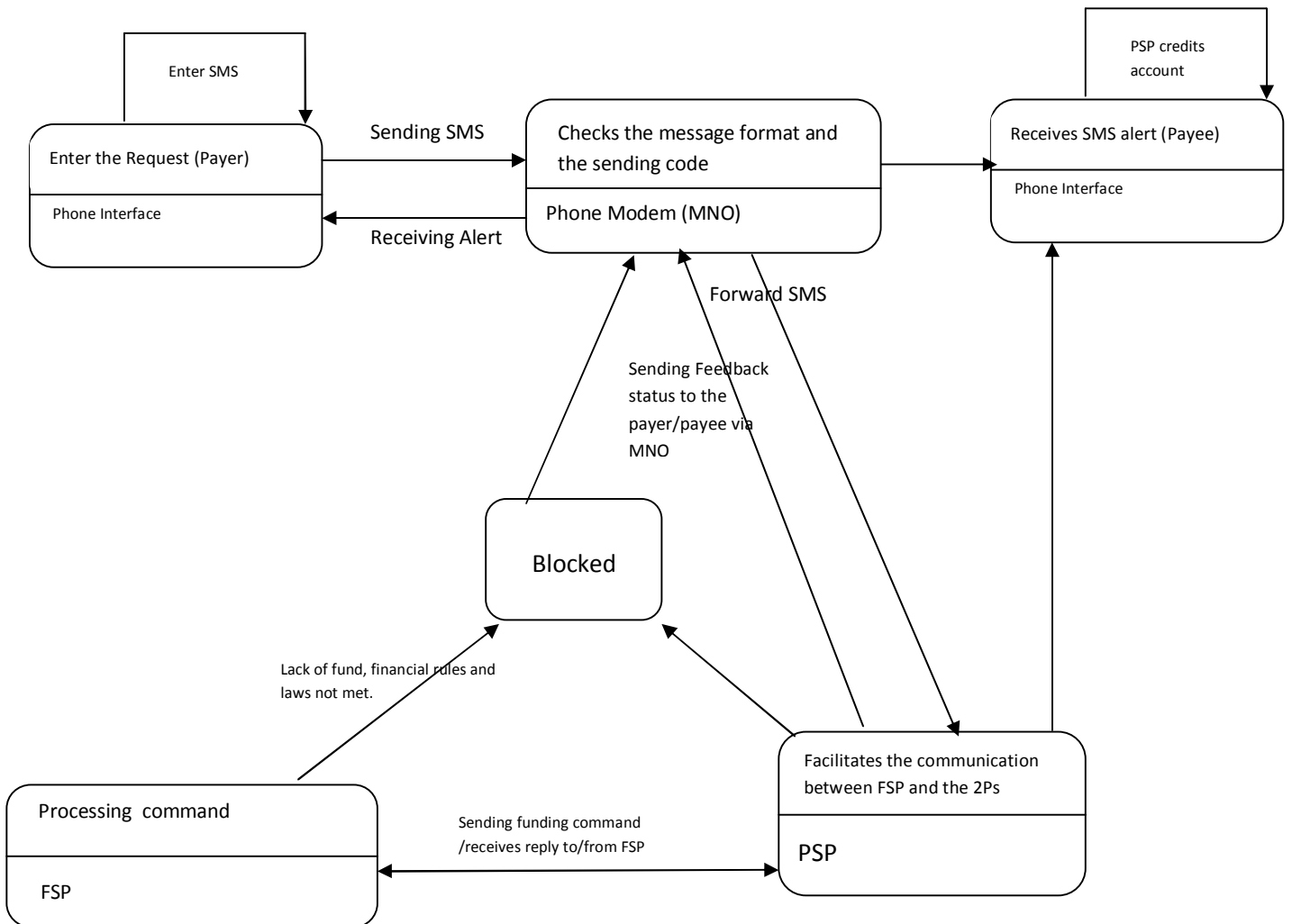


Fig. 3.3: State Chart Diagram of Mobile Payment System

3.3 Design of the Proposed System

The design stage of the proposed system describes a final system and the process by which it is developed; this includes database design, system architecture, input design, output design and the algorithm design.

3.3.1 Database Design

Database design is the process of producing a detailed data model of database. This logical data model contains all the needed logical and physical design choices and physical storage parameters needed to generate a design in a data definition language, which can then be used to create a database. A fully attributed data model contains detailed attributes for each entity.

The process of doing database design generally consists of number of steps which will be carried out by the database designer, usually the designer must:

- Determine the relationship between the different data elements.
- Superimpose a logical structure upon the data on the basis of these relationships.

There are more than one database model which can used but for the case of this project, the relational model was used. In the relational model these are the tables and views.

The Mobile Payment System was designed using MySQL, the database is made up of four (4) tables. Which are: -

1. createaccount Table
2. fundaccount Table
3. recievedsms Table
4. sentsms Table

The detailed structure of each table is shown in tables 3.1, 3.2, 3.3 and 3.4 respectively:

Table 3.1: createaccount Table

Field	Data Type	Size	Null	Description	Action	Extra
ID	Int	11	No	Unique Table ID	Primary Key	Auto_increment
LastName	Varchar	50	No	User Last Name		
FirstName	Varchar	50	No	User First Name		
AccountNo	Varchar	10	No	User Account No.		
AccountType	Varchar	15	Yes	User Account Type		
Bank	Varchar	50	No	User Bank		
PinNum	Varchar	50	No	Unique User PIN		Auto_generate
Phone	Varchar	50	No	User Phone No.		

Table 3.2 fundaccount Table

Field	Data Type	Size	Null	Description	Action	Extra
ID	Int	11	No	Unique Table ID	Primary Key	auto_increment
PIN	Varchar	50	No	Unique User PIN		
Credit	Varchar	50	Yes	User Account Credite		

Table 3.3 receivedsms Table

Field	Data Type	Size	Null	Description	Action	Extra
ID	Int	11	No	Unique Table ID	Primary Key	auto_increment
Phone	Varchar	20	No	User Phone No		
textMessage	Varchar	200	No	User Account Alert		
recievedTime	Varchar	50	No	Time Received SMS		

Table 3.4 sentsms Table

Field	Data Type	Size	Null	Description	Action	Extra
ID	Int	11	No	Unique Table ID	Primary Key	auto_increment
Phone	Varchar	20	No	User Phone No		
textMessage	Varchar	200	No	User Account Alert		
sentTime	Varchar	50	No	Time sent SMS		

3.3.2 System Architecture

The Mobile Payment system works using client-server architecture and can either be implemented as a dependent service or independent service. The system described below is used as a dependent service; this implies that the server (running the SMS application has a modem with a standard SIM card connected to it). Fig 3.4 shows the architecture of mobile payment system:

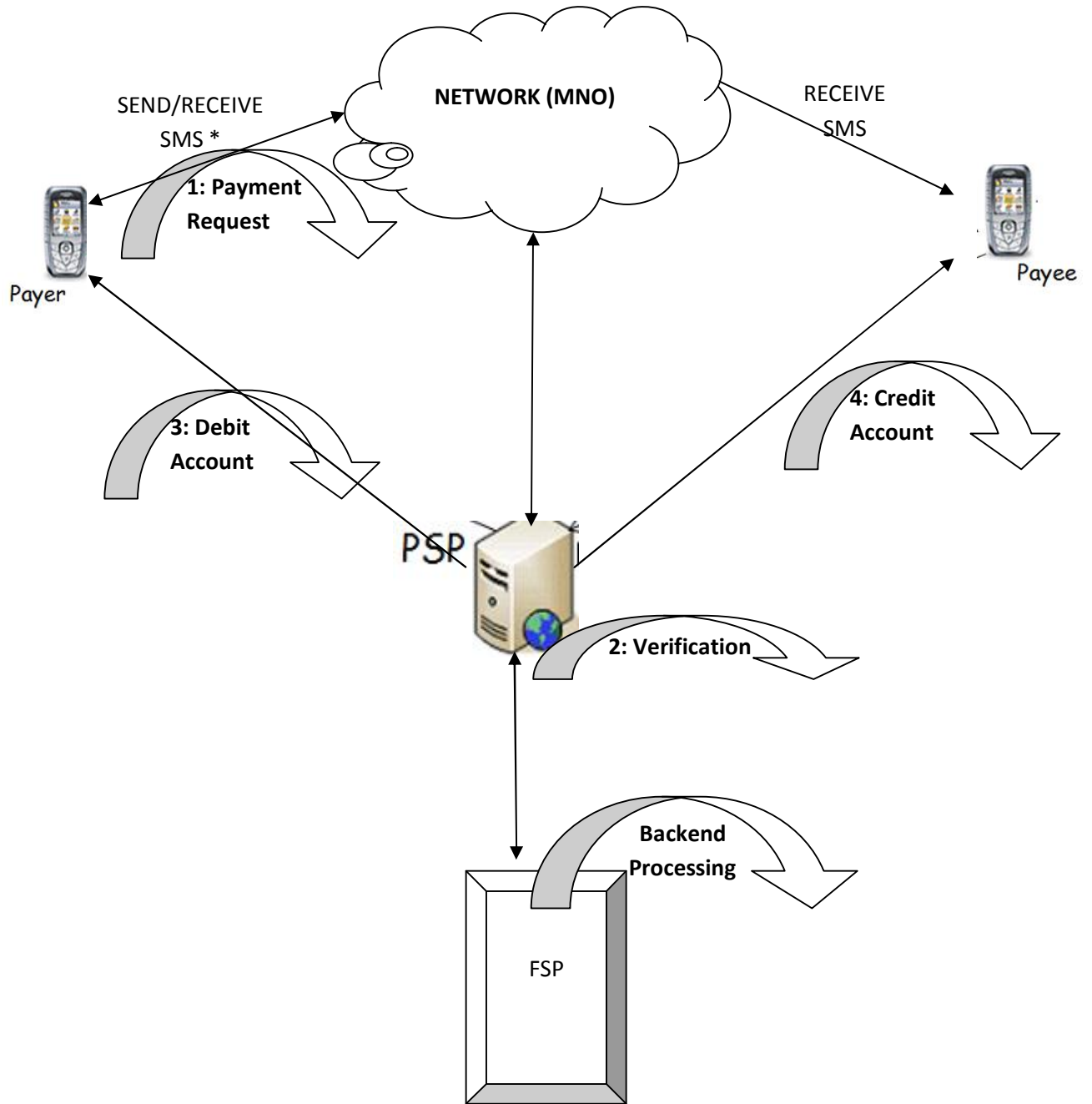


Fig. 3.4: Mobile Payment System Architecture

- * The customer uses his mobile device to send a payment request to a PSP over a wireless network. This request includes the details of the payee and amount to be paid.
- * A PSP verifies the credentials of the customer and the payee (basically it checks whether the customer and payee have registered for such an m-payment service).
- * After successful confirmation, the PSP performs backend processing to update the accounts of the payer and the payee.
- * It sends a debit receipt via MNO to the payer. It will also send a Credit receipt message to the payee.

3.3.3 Input Design

Input design refers to the input data, how the input is to be fed into the system. It includes identification, content of the format, and frequency of the recent data expended volume condition requiring its appearance in the system and validation procedure to be used to ensure accuracy. The input format describes how to interpret the contents of an input field as a number or a string, it is used by commands such as data list that read data or syntax files into the PSP active dataset. Fig. 3.5 shows the mobile payment system input format:

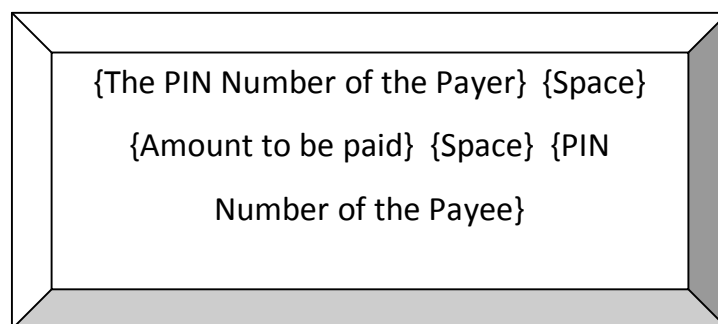


Fig 3.5: Mobile Payment System Input Format

3.3.4 Output Design

Outputs are the reports that the system produces, whether on the screen, on the paper or in other media, such as web. Outputs are the most visible part of any system, because a primary reason for using an information system is to access the information that it produces. The goal of the output mechanism is to present information to users so that they can accurately understand it with the least effort. The fundamental principle for output design reflects how outputs are used and way to make it simpler for users to understand them.

Every input format corresponds to a default output format that specifies the formatting used when the value is output later. There are two output formats for the proposed system, they include, Payee output format and Payer output format. Fig. 3.6 and 3.7 shows the payee and payer output format respectively:

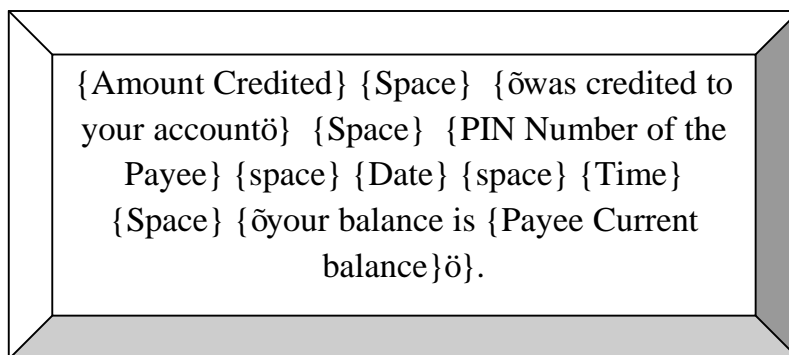


Fig. 3.6: Payee Output Format

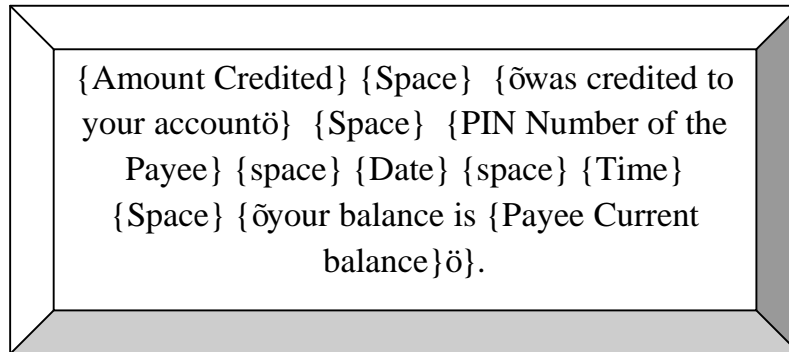


Fig 3.7: Payer Output format

3.3.5 Process Design

Process design involves the activity of determining the workflow, equipment needs and implementation requirements for the translation of input data to output data. Process design typically uses a number of tools including flowchart, process simulation software and scale models. This is a series of steps that is followed to come up with a solution to a problem. In the proposed system, an SMS will be sent to a specified code into the mobile payment software which checks the format of the SMS (whether it is in-line with the specified format), the transaction type, the balance in the account, etc and reply the request based on the findings. Figure 3.8 shows the process design of the proposed system (Mobile Payment System).

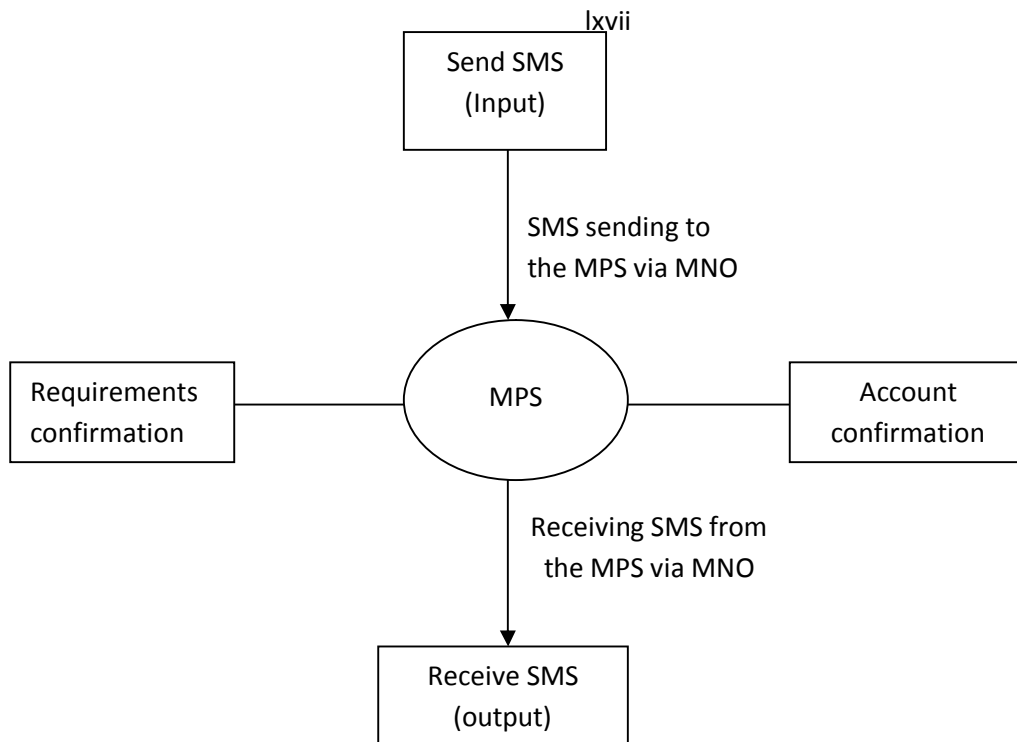


Fig. 3.8: Process design of MPS

CHAPTER FOUR

SYSTEM IMPLEMENTATION

4.1 Programming Language Choice and Justification

The application platform is .NET Framework with Visual Studio Express Edition as the Integrated Development Environment (IDE). The software was designed using Visual Basic .NET (VB.Net) with an AT command (Attention are the commands used to control MODEMs), while MySQL server manages the database.

VisualBasic.Net is a multi-paradigm, high level programming language, implemented on the .NET Framework. The features of VB.Net that made it the choice for the development software are:

- VB.Net provides manages code execution that runs under Common Language Runtime (CLR), resulting in robust, stable and secure applications.
- This Software comes with ADO.Net, which follows the disconnected paradigm, i.e. once the required records are fetched, the connection no longer exists. It also retrieves the records that are expected to be accessed in the immediate future. This enhances scalability of the application to a great extent.
- VB.Net uses XML to transfer data between the various layers in the DNA Architecture i.e. data are passed as simple text strings.
- The CLR takes care of garbage collection i.e. the CLR releases resources as soon as an object is no more in use. This relieves the developer from thinking of ways to manage memory. CLR does this for them.

4.2 Implementation Architecture

The Implementation architecture shows a block diagram identifying the various components of the software and their linkages. The implementation architecture of the mobile payment system is shown in Fig. 4.1:

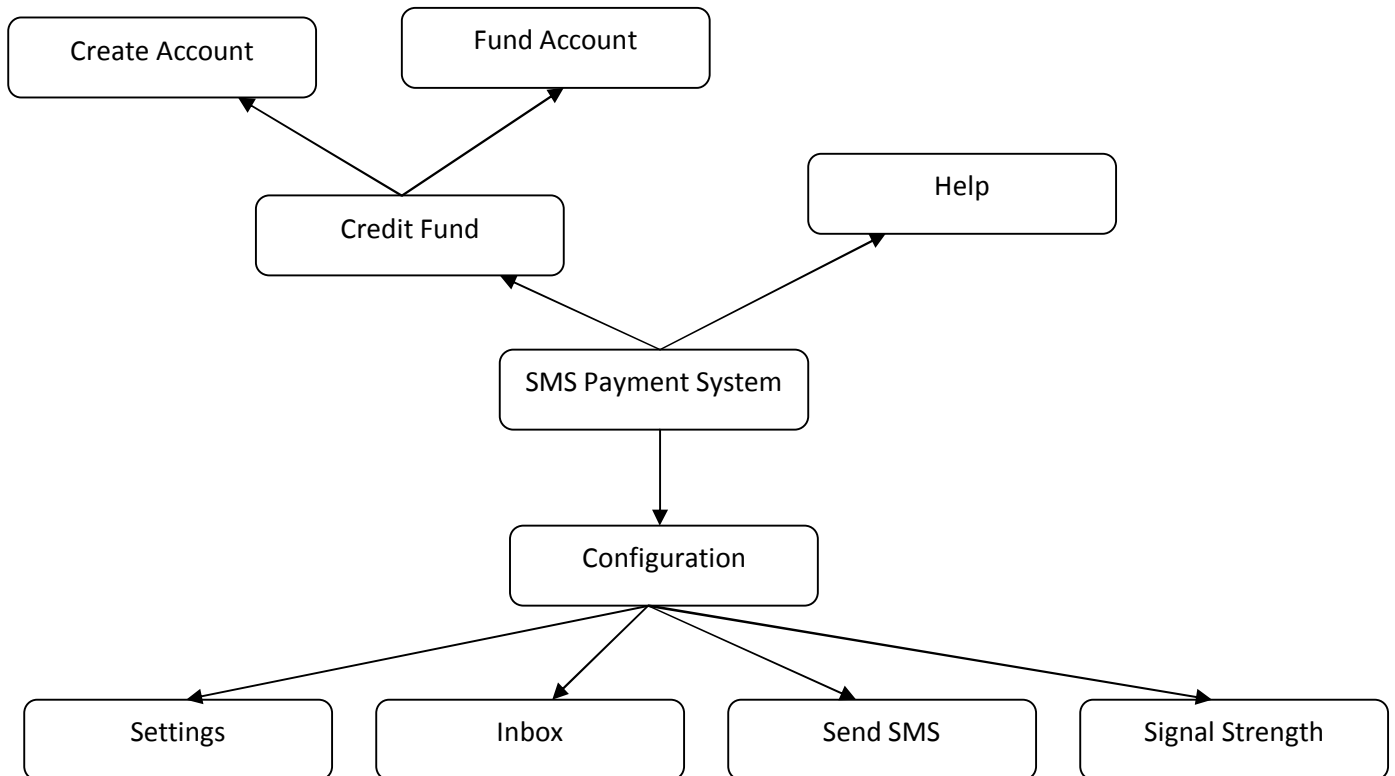


Fig 4.1: Implementation Architecture of Mobile Payment System

4.3 Software Testing

The system is tested at every stage of its development in order to be able to detect errors and remove them immediately. Figs. 4.2 to 4.3 show the system testing with the input and the outputs:

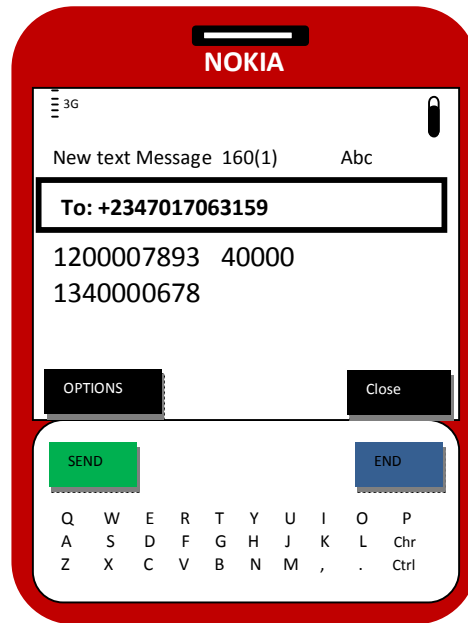


Fig 4.2: The input with sample data

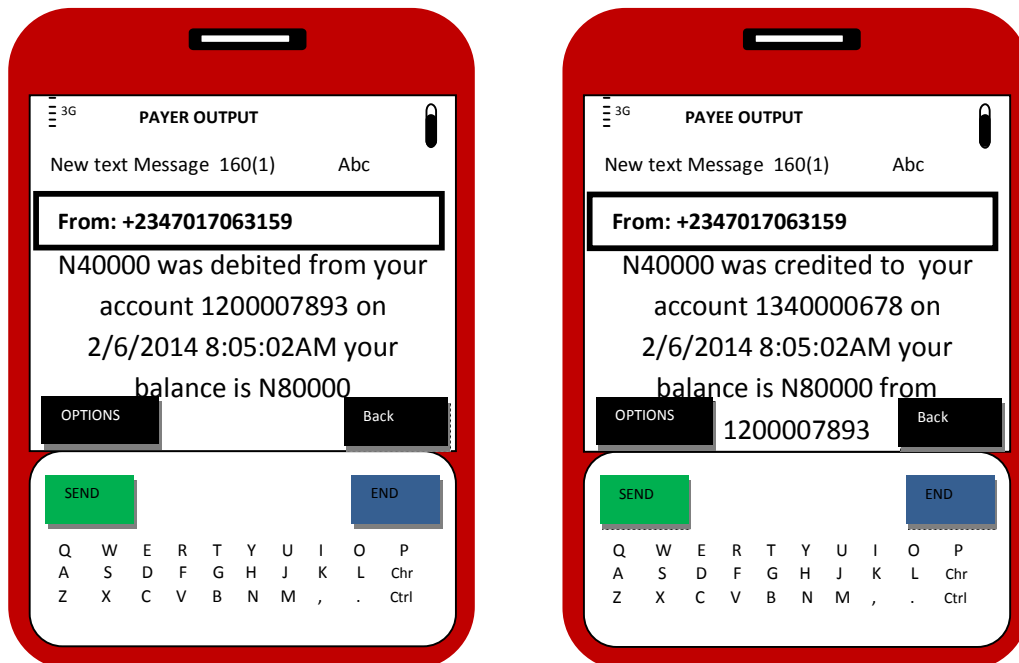


Fig. 4.3: The output for the payer and the payee

4.4 Screen Shots of Demos

See appendix B

4.5 User Manual

User manual is one of the important aspects of a successful system development because the users of the new system are capable of making it an operational success. This can be achieved by providing a user manual that can guide their usage of the system. Steps 1 to 4 are needed to be observed by the user for effective implementation of the payment system:

- Step1:** Create an Account with the Mobile Payment System (a PIN will be automatically generated for the new client on a successful registration)
- Step2:** Fund the account from your Bank Account (from the bank account number specified during step1)
- Step3:** From your mobile phone, open your create message, using the appropriate format, send a transaction request.
- Step 4:** The user will receive a reply (either a successful transaction reply or an error message)

CHAPTER FIVE

SUMMARY AND CONCLUSION

5.1 Summary

The study has investigated the payment systems that are prevalent in Nigeria with great emphases on cashless economy, which is triggered with the increased number of mobile phone users today, due to its easy availability, and the large number of the banking population in Nigeria, Mobile Payment System, which provides the ability for a person to use his/her mobile phone to undertake money related transaction securely, is the new trend in payments systems globally. The findings of the study include:

- The researcher observed that the implementation of the mobile payment system via SMS is a simple and easy-to-use payment system for anyone that has a phone and knows how to send and receive SMS.
- Also the implementation of the payment system from the researcher's observation will improve hygiene on site.
- The payment system from the findings will facilitate transaction by reducing the queue in payment points and stress of cash economy.
- Mobile payment system if implemented from the researcher's observation will eliminate the crimes associated with cash economy and check inflation by reducing the amount of cash in circulation.
- Finally the study will enhance CBN new policy on cashless economy if implemented.

5.2 Conclusion

In conclusion, cashless economy is rather sophisticated means of solving the problems associated with the use of cash payment system, bearing in mind that payments are central to the growth of modern civilizations. The study developed a prototype of mobile payment system which simulates the implementation of cashless economy as payment system in every economy is a reflection of the efficiency of the banking sector. The study also assessed the level of usage of cashless economy in Nigeria and the general method acceptable by all uses of phone without any barrier like the type of phone that can be used to effectively implement cashless economy. Mobile payment system carried out in this research is a result oriented, domestic payment system that can compete out other country who has implemented cashless economy.

5.3 Recommendation

To make for the smooth implementation of the cashless system in Nigeria, the following measures are recommended. There is the need to intensify the public enlightenment programme about the cashless system so that everybody will be acquainted with the system before its introduction since it will affect everybody. Since there is a high rate of illiteracy, and all people must be brought into the system, the government should design special enlightenment programmes for the non-literates, using probably signs and symbols to educate this segment on how to operate the cashless system. Nigeria should make concerted efforts to design an internet security framework

to check online fraud so that the public can be assured and protected against cyber attack and fraud. There should be a careful study of the system to determine the number of point of sales terminals that will ensure its smooth running in Nigeria so as to prevent unnecessary friction in the system. There should be adequate legislation on all aspects of the operations of the cashless system so that both the operators of the system and the public can be adequately protected.

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APPENDIX: CODES

```
Imports System.IO.Ports
```

```
Public Class frmMain
```

```
    Private WithEvents objSMS As New mCore.SMS
```

```
    Private strMyAppName As String = "SMS App"
```

```
    Private blnFormLoaded As Boolean = False
```

```
    Private Sub frmMain_FormClosed(ByVal sender As Object, ByVal e As  
System.Windows.Forms.FormClosedEventArgs) Handles Me.FormClosed
```

```
        objSMS.Dispose()
```

```
        objSMS = Nothing
```

```
    End Sub
```

```
    Private Sub frmMain_Load(ByVal sender As System.Object, ByVal e As System.EventArgs)  
Handles MyBase.Load
```

```
        '-----
```

```
        'Initialize COM Port DropDown List
```

```
        '-----
```

```
        cboPort.Items.Add("Select Port")
```

```
        Try
```

```
            "Display all available COM Ports"
```

```
            Dim ports As String() = SerialPort.GetPortNames()
```

```
            ' Add all port names to the combo box:
```

```
            For Each port As String In ports
```

```
                Me.cboPort.Items.Add(port)
```

```
            Next
```

```
        Catch ex As Exception
```

```
            MsgBox(ex.Message)
```

```
        End Try
```

```
        cboPort.SelectedIndex = 0
```

```
        '-----
```

```
        'Initialize BaudRate DropDown List
```

```
        '-----
```

```
        With cboBaudRate
```

```
            .Items.Add("110")
```

```
            .Items.Add("300")
```

```
            .Items.Add("1200")
```

```
            .Items.Add("2400")
```

```
            .Items.Add("4800")
```

```
            .Items.Add("9600")
```

```
            .Items.Add("14400")
```

```
            .Items.Add("19200")
```

```
            .Items.Add("38400")
```

```
            .Items.Add("57600")
```

```
            .Items.Add("115200")
```

```
            .Items.Add("230400")
```

```
            .Items.Add("460800")
```

```
            .Items.Add("921600")
```

```
        End With
```



```

cboBaudRate.SelectedIndex = cboBaudRate.FindString(CType(objSMS.BaudRate,
Integer).ToString)

'-----
'Initialize DataBits DropDown List
'-----
With cboDataBits
    .Items.Add("4")
    .Items.Add("5")
    .Items.Add("6")
    .Items.Add("7")
    .Items.Add("8")
End With
cboDataBits.SelectedIndex = cboDataBits.FindString(CType(objSMS.DataBits,
Integer).ToString)

'-----
'Initialize Parity DropDown List
'-----
With cboParity
    .Items.Add("None")
    .Items.Add("Odd")
    .Items.Add("Even")
    .Items.Add("Mark")
    .Items.Add("Space")
End With
cboParity.SelectedIndex = CType(objSMS.Parity, Integer)

'-----
'Initialize StopBits DropDown List
'-----
With cboStopBits
    .Items.Add("1")
    .Items.Add("2")
    .Items.Add("1.5")
End With
cboStopBits.SelectedIndex = CType(objSMS.StopBits, Integer) - 1

'-----
'Initialize FlowControl DropDown List
'-----
With cboFlowControl
    .Items.Add("None")
    .Items.Add("Hardware")
    .Items.Add("Xon/Xoff")
End With
cboFlowControl.SelectedIndex = CType(objSMS.FlowControl, Integer)

'-----
'Initialize Send Delay, Send Retry & Timeout
'-----
txtSendDelay.Text = (objSMS.SendDelay / 1000).ToString
txtSendRetry.Text = objSMS.SendRetry.ToString
txtTimeout.Text = (objSMS.Timeout / 1000).ToString

chkDisableCheckPIN.Checked = objSMS.DisableCheckPIN

objSMS.ReadIntervalTimeout = 100

```

```

objSMS.DelayAfterPIN = 20000

chkIncomingCall.Checked = objSMS.IncomingCallIndication
objSMS.Queue.Enabled = True
chkQueue.Checked = objSMS.Queue.Enabled

'-----
'Initialize Message Memory DropDown List
'-----
With cboMsgMemory
    .Items.Add("SIM")
    .Items.Add("Phone")
    .Items.Add("SIM+Phone")
End With
cboMsgMemory.SelectedIndex = 0

'-----
'Initialize incoming message concatenate setting
'-----
If objSMS.Inbox.Concatenate Then
    chkInConcatenate.Checked = True
    objSMS.NewMessageConcatenate = True
End If

'-----
'Initialize new incoming message indication setting
'-----
If objSMS.NewMessageIndication Then chkNewMsgIndication.Checked = True

If objSMS.AutoDeleteNewMessage Then chkAutoDelete.Checked = True

If chkNewMsgIndication.Checked Then
    chkRefreshInbox.Enabled = True
    chkAutoDelete.Enabled = True
Else
    chkRefreshInbox.Enabled = False
    chkAutoDelete.Enabled = False
End If

If objSMS.DeliveryReport Then chkDeliveryReport.Checked = True

'-----
'Initialize Long Message DropDown List
'-----
With cboLongMsg
    .Items.Add("Truncate")
    .Items.Add("Simple Split")
    .Items.Add("Formatted Split")
    .Items.Add("Concatenate")
End With
cboLongMsg.SelectedIndex = CType(objSMS.LongMessage, Integer)

'-----
'Initialize Encoding Type DropDown List
'-----
With cboEncoding
    .Items.Add("Default Alphabet")
    .Items.Add("ANSI (8-Bit)")

```

```

        .Items.Add("Unicode (16-Bit)")
    End With
    cboEncoding.SelectedIndex = CType(objSMS.Encoding, Integer)

    lblNoteSMS.Text = "NOTE: For non-english language messages you must select
encoding type as Unicode (16-Bit)." & vbCrLf & "Use a suitable keyboard/IME to type non-
english messages."

```

```

'-----
'Initialize message validity setting
'-----

```

```

txtValidity.Text = "24"
With cboValidity
    .Items.Add("Min")
    .Items.Add("Hour")
    .Items.Add("Day")
    .Items.Add("Week")
End With
cboValidity.SelectedIndex = 1

With cboSMSQPriority
    .Items.Add("High")
    .Items.Add("Normal")
    .Items.Add("Low")
End With
cboSMSQPriority.SelectedIndex = 1

chkSMSQueue.Checked = False
cboSMSQPriority.Enabled = False
lblSMSQPriority.Enabled = False

```

```
End Sub
```

```

Private Sub cmdConnect_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles cmdConnect.Click
    Try
        If cboPort.SelectedIndex = 0 Then
            MsgBox("Select a serial port", MsgBoxStyle.Critical, strMyAppName)
            Exit Sub
        End If

        cmdConnect.Text = "Please Wait..."
        cmdConnect.Enabled = False
        cmdDisconnect.Enabled = False

        SetCommParameters()

        If objSMS.Connect() Then
            cmdConnect.Enabled = False
            cmdDisconnect.Enabled = True

            ' Retrieve SMSC setting from SIM card
            txtSMSC.Text = objSMS.SMSC
            Select Case objSMS.MessageMemory
                Case mCore.MessageMemory.SM : cboMsgMemory.SelectedIndex = 0
            End Select
        End If
    Catch ex As Exception
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
    End Try

```

```

        Case mCore.MessageMemory.ME : cboMsgMemory.SelectedIndex = 1
        Case mCore.MessageMemory.MT : cboMsgMemory.SelectedIndex = 2
    End Select

    MsgBox("Connection successful", MsgBoxStyle.Information, strMyAppName)

Else
    MsgBox("Connection error", MsgBoxStyle.Critical, strMyAppName)

    cmdConnect.Enabled = True
    cmdDisconnect.Enabled = False
End If

Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
Exit Try

Catch ex As Exception
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
Exit Try

End Try

Try
    cmdConnect.Text = "Connect"
    If objSMS.IsConnected Then
        cmdConnect.Enabled = False
        cmdDisconnect.Enabled = True
        Timer1.Enabled = True
    Else
        cmdConnect.Enabled = True
        cmdDisconnect.Enabled = False
    End If
Catch ex As Exception

End Try
End Sub
Public Sub SetCommParameters()
    'Set communication parameters
    'check if port is already connected

    Try
        If Not objSMS.IsConnected And cboPort.SelectedIndex > 0 Then
            objSMS.Port = cboPort.Text
            objSMS.BaudRate = CType(CInt(cboBaudRate.Text), mCore.BaudRate)
            objSMS.DataBits = CType(CInt(cboDataBits.Text), mCore.DataBits)
            objSMS.Parity = CType(cboParity.SelectedIndex, mCore.Parity)
            objSMS.StopBits = CType(cboStopBits.SelectedIndex + 1, mCore.StopBits)
            objSMS.FlowControl = CType(cboFlowControl.SelectedIndex,
mCore.FlowControl)
            objSMS.PIN = txtPIN.Text
            objSMS.DisableCheckPIN = chkDisableCheckPIN.Checked
        End If

    Catch ex As mCore.GeneralException
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)

```

```

    End Try
End Sub
Private Sub cmdDisconnect_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles cmdDisconnect.Click
    cmdDisconnect.Text = "Please Wait..."
    cmdDisconnect.Enabled = False
    cmdConnect.Enabled = False

    Try
        objSMS.Disconnect()
        cmdConnect.Enabled = True
        cmdDisconnect.Enabled = False

    Catch ex As mCore.GeneralException
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
    Exit Try

    Catch ex As Exception
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
    Exit Try

    End Try

    cmdDisconnect.Text = "Disconnect"
End Sub

Private Sub cmdInboxRefresh_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles cmdInboxRefresh.Click
    RefreshInbox()
End Sub

Private Sub cmdMsgDelete_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles cmdMsgDelete.Click
    Dim i As Integer

    Try
        cmdMsgDelete.Enabled = False

        'Delete selected message(s)
        If MsgBox("Delete selected message(s)?", MsgBoxStyle.YesNo, strMyAppName) =
MsgBoxResult.Yes Then
            lblMsgCount.Text = "Deleting selected messages..."
            For i = lstInbox.Items.Count To 1 Step -1
                If lstInbox.Items.Item(i - 1).Checked Then
                    objSMS.Inbox.Message(i).Delete()
                End If
            Next
            lstInbox.Items.Clear()
            FillInboxList()
        End If

        lblMsgCount.Text = "Total Messages: " & objSMS.Inbox.Count
        If objSMS.Inbox.Count > 0 Then lblMsgCount.Text = lblMsgCount.Text & vbCrLf &
"(double click on a message to view)"

    Catch ex As mCore.SMSDeleteException
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
    Exit Try

```

```

Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
Exit Try

Catch ex As Exception
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
Exit Try

End Try

cmdMsgDelete.Enabled = True

End Sub

Private Sub RefreshInbox()
    Dim objInbox As mCore.Inbox = objSMS.Inbox

    SetCommParameters()

    lblMsgCount.Text = "Reading messages... Please wait..."
    System.Windows.Forms.Application.DoEvents()

    Try
        cmdInboxRefresh.Enabled = False
        cmdMsgDelete.Enabled = False
        cboMsgMemory.Enabled = False
        chkInConcatenate.Enabled = False

        If chkCleanUp.Checked Then
            objInbox.Refresh(mCore.MessageType.ReceivedAllMessages, True)
        Else
            objInbox.Refresh()
        End If

        lstInbox.Items.Clear()
        FillInboxList()

    Catch ex As mCore.SMSReadException
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
    Exit Try

    Catch ex As mCore.GeneralException
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
    Exit Try

    Catch ex As Exception
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
    Exit Try

    End Try

    lblMsgCount.Text = "Total Messages: " & objSMS.Inbox.Count
    If objSMS.Inbox.Count > 0 Then
        lblMsgCount.Text = lblMsgCount.Text & vbCrLf & "(double click on a message to
view)"
    End If

```

```

cmdMsgDelete.Enabled = True
cmdInboxRefresh.Enabled = True
cboMsgMemory.Enabled = True
chkInConcatenate.Enabled = True

End Sub
Public str1, str2, str3 As String
Private Sub FillInboxList()
    Dim i As Integer
    Dim Msg As mCore.Message, objInbox As mCore.Inbox = objSMS.Inbox

    Try
        'Read properties of each message read from modem
        'and fill the listview collumns
        i = 0
        For Each Msg In objInbox
            With lstInbox
                .Items.Add(Msg.Phone)
                .Items.Item(i).SubItems.Add(Msg.Text)
                .Items.Item(i).SubItems.Add(Msg.TimeStamp.ToString)
                str1 = Msg.Phone
                str2 = Msg.Text
                str3 = Msg.TimeStamp.ToString
                i += 1
            End With
        Next

        Catch ex As mCore.SMSReadException
            MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
            Exit Try

        Catch ex As mCore.GeneralException
            MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
            Exit Try

        Catch ex As Exception
            MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
            Exit Try

    End Try

End Sub

Private Sub cmdSendMsg_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles cmdSendMsg.Click
    Dim strSendResult As String, strKey As String

    If txtPhone.Text.Trim.Length = 0 Then
        MsgBox("Destination phone number is required!", vbExclamation, strMyAppName)
        Exit Sub
    End If

    cmdSendMsg.Text = "Sending SMS...Please Wait..."
    cmdSendMsg.Enabled = False

    System.Windows.Forms.Application.DoEvents()

    Try
        SetCommParameters()
    
```

```

'Set message validity period
objSMS.Validity = txtValidity.Text & cboValidity.Text.Substring(0, 1)

If chkSMSQueue.Checked Then
    'Send the text message to message queue
    strKey = objSMS.SendSMSToQueue(txtPhone.Text, txtMessage.Text,
CType(cboSMSQPriority.SelectedIndex + 1, mCore.QueuePriority), chkAlert.Checked)
    lblQueueCount.Text = "Messages in queue: " & objSMS.Queue.Count.ToString
    'MsgBox("Message sent to queue!" & vbCrLf & vbCrLf & "[Message Queue Key:
" & strKey & "]", MsgBoxStyle.Information, strMyAppName)
Else
    'Send the text message
    strSendResult = objSMS.SendSMS(txtPhone.Text, txtMessage.Text,
chkAlert.Checked)
    lblsent.Text = "Message sent!" & vbCrLf & vbCrLf & "[Message Ref.: " &
strSendResult & "]"
End If
Catch ex As mCore.SMSSendException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
Exit Try

Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
Exit Try

Catch ex As Exception
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
Exit Try

End Try

cmdSendMsg.Text = "Send Message"
cmdSendMsg.Enabled = True
End Sub

Private Sub cmdClearQueue_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles cmdClearQueue.Click
    objSMS.Queue.Clear()
    Control.CheckForIllegalCrossThreadCalls = False
    lblQueueCount.Text = "Messages in queue: " & objSMS.Queue.Count.ToString
    Control.CheckForIllegalCrossThreadCalls = True
    Windows.Forms.Application.DoEvents()
End Sub

Private Sub cmdNetRefresh_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles cmdNetRefresh.Click
    Dim strNetwork As String = ""

    cmdNetRefresh.Text = "Please wait..."
    cmdNetRefresh.Enabled = False
    lblNetwork.Text = "Reading... Please wait..."
    prbSignal.Value = 0
    lblNetwork.Enabled = False
    prbSignal.Enabled = False

    System.Windows.Forms.Application.DoEvents()

```



```

Try
    SetCommParameters()

    'Retrieve GSM network signal strength
    prbSignal.Value = objSMS.SignalStrength

    System.Windows.Forms.Application.DoEvents()

    'Read service provider network identification
    'Depending on the modem and the network, this process may take some time
    strNetwork = objSMS.Network

Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
Exit Try

Catch ex As Exception

End Try

If strNetwork = "" Then
    strNetwork = "Read timeout"
End If

lblNetwork.Text = strNetwork

cmdNetRefresh.Text = "Refresh"
cmdNetRefresh.Enabled = True
lblNetwork.Enabled = True
prbSignal.Enabled = True
End Sub

Private Sub cmdMdmRefresh_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles cmdMdmRefresh.Click
    Dim BattLevel As Integer, OwnNumber As String = ""

    cmdMdmRefresh.Text = "Please wait..."
    cmdMdmRefresh.Enabled = False

    lblManufacturer.Enabled = False
    lblModel.Enabled = False
    lblRevision.Enabled = False
    lblIMEI.Enabled = False
    lblIMSI.Enabled = False
    lblBattery.Enabled = False
    lblOwnNum.Enabled = False

    lblManufacturer.Text = "Reading... Please wait..."
    lblModel.Text = "Reading... Please wait..."
    lblRevision.Text = "Reading... Please wait..."
    lblIMEI.Text = "Reading... Please wait..."
    lblIMSI.Text = "Reading... Please wait..."
    lblBattery.Text = "Reading... Please wait..."
    lblOwnNum.Text = "Reading... Please wait..."

    System.Windows.Forms.Application.DoEvents()

    SetCommParameters()

```

```
Try
    'Retrieve modem Manufacturer information
    lblManufacturer.Text = objSMS.Manufacturer
Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
End Try

lblManufacturer.Enabled = True
System.Windows.Forms.Application.DoEvents()

Try
    'Retrieve modem Model information
    lblModel.Text = objSMS.Model
Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
End Try

lblModel.Enabled = True
System.Windows.Forms.Application.DoEvents()

Try
    'Retrieve firmware Revision information
    lblRevision.Text = objSMS.Revision
Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
End Try

lblRevision.Enabled = True
System.Windows.Forms.Application.DoEvents()

Try
    'Retrieve modem IMEI information
    lblIMEI.Text = objSMS.IMEI
Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
End Try

lblIMEI.Enabled = True
System.Windows.Forms.Application.DoEvents()

Try
    'Retrieve IMSI information
    lblIMSI.Text = objSMS.IMSI
Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
End Try

lblIMSI.Enabled = True
System.Windows.Forms.Application.DoEvents()

Try
    'Retrieve battery charge level
    'If battery charge level reading is not supported,
    'the property will return -1
    BattLevel = objSMS.BatteryLevel
Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
```

```

End Try

If BattLevel >= 0 Then
    lblBattery.Text = BattLevel.ToString & "%"
Else
    lblBattery.Text = "Unknown"
End If
lblBattery.Enabled = True
System.Windows.Forms.Application.DoEvents()

Try
    'Retrieve MSISDN of the SIM card used
    'If MSISDN reading is not supported,
    'the property will return blank string
    OwnNumber = objSMS.OwnNumber
Catch ex As mCore.GeneralException
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
End Try

If OwnNumber.Length > 0 Then
    lblOwnNum.Text = OwnNumber
Else
    lblOwnNum.Text = "Unknown"
End If
lblOwnNum.Enabled = True

cmdMdmRefresh.Text = "Refresh"
cmdMdmRefresh.Enabled = True

End Sub

Private Sub chkQueue_CheckedChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles chkQueue.CheckedChanged
    chkQueue.Enabled = False
    Try
        objSMS.Queue.Enabled = chkQueue.Checked
    Catch ex As Exception
        Exit Try
    End Try
    chkQueue.Checked = objSMS.Queue.Enabled
    chkQueue.Enabled = True
End Sub

Private Sub chkDeliveryReport_CheckedChanged(ByVal sender As System.Object, ByVal e
As System.EventArgs) Handles chkDeliveryReport.CheckedChanged
    Try
        chkDeliveryReport.Enabled = False

        SetCommParameters()

        'Set delivery report for outgoing SMS
        objSMS.DeliveryReport = chkDeliveryReport.Checked

    Catch ex As mCore.GeneralException
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
        chkDeliveryReport.Checked = objSMS.DeliveryReport
    End Try

```

```
chkDeliveryReport.Enabled = True
```

```
End Sub
```

```
Private Sub chkSMSQueue_CheckedChanged(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles chkSMSQueue.CheckedChanged
```

```
    If chkSMSQueue.Checked Then
        cboSMSQPriority.Enabled = True
        lblSMSQPriority.Enabled = True
```

```
    Else
        cboSMSQPriority.Enabled = False
        lblSMSQPriority.Enabled = False
```

```
    End If
```

```
End Sub
```

```
Private Sub chkAlert_CheckedChanged(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles chkAlert.CheckedChanged
```

```
End Sub
```

```
Private Sub chkInConcatenate_CheckedChanged(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles chkInConcatenate.CheckedChanged
```

```
    objSMS.Inbox.Concatenate = chkInConcatenate.Checked
```

```
End Sub
```

```
Private Sub chkNewMsgIndication_CheckedChanged(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles chkNewMsgIndication.CheckedChanged
```

```
Try
```

```
    chkNewMsgIndication.Enabled = False
```

```
    SetCommParameters()
```

```
    objSMS.NewMessageIndication = chkNewMsgIndication.Checked
```

```
    If chkInConcatenate.Checked Then
        objSMS.NewMessageConcatenate = True
```

```
    Else
        objSMS.NewMessageConcatenate = False
```

```
    End If
```

```
Catch ex As mCore.GeneralException
```

```
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
```

```
    chkNewMsgIndication.Checked = objSMS.NewMessageIndication
```

```
    chkInConcatenate.Checked = objSMS.NewMessageConcatenate
```

```
    Exit Try
```

```
Catch ex As Exception
```

```
    Exit Try
```

```
End Try
```

```
chkNewMsgIndication.Enabled = True
```

```
If chkNewMsgIndication.Checked Then
```

```
    chkRefreshInbox.Enabled = True
```

```
    chkAutoDelete.Enabled = True
```

```
Else
```

```

        chkRefreshInbox.Enabled = False
        chkAutoDelete.Enabled = False
    End If
End Sub

Private Sub chkAutoDelete_CheckedChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles chkAutoDelete.CheckedChanged
    Try
        objSMS.AutoDeleteNewMessage = chkAutoDelete.Checked
    Catch ex As mCore.GeneralException
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
        chkAutoDelete.Checked = objSMS.AutoDeleteNewMessage
    Exit Try
    Catch ex As Exception
        MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
        chkAutoDelete.Checked = objSMS.AutoDeleteNewMessage
    Exit Try

End Try

End Sub
Dim k, k2, k3, k5, k6, str, st, st1 As String
Dim k4 As Integer, count = 0, count1 = 0
Dim bal As Integer = 0, bal1 = 0
Private Sub Timer1_Tick(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles Timer1.Tick
    Try
        If objSMS.IsConnected() Then

            RefreshInbox()

            If str2 = "" Or Val(str2) = 0 Then
                Exit Sub
            Else
                Dim i As Integer = 0, i2 = 0, i3 = 0, i4 = 0, i1 = 0
                For i = 0 To str2.Length - 1
                    If str2(i) = " " Then
                        i2 += 1
                        If i2 = 1 Then
                            i4 = i + 1
                            k = Mid(str2, i2, i)
                            k = Trim(k)
                        ElseIf i2 = 2 Then
                            i4 = i - i4
                            k2 = Mid(str2, k.Length + 2, i4)
                            k2 = Trim(k2)
                            i1 = Val(k.Length) + i4 + 2
                            i3 = Val(str2.Length + 1) - i1
                            k3 = Mid(str2, i1, i3)
                            k3 = Trim(k3)
                        End If
                    End If
                Next
            End If

            '===== get receivers phone number =====
            If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()

```

```

rs.Open("select * from createaccount where PinNum = '" & k3 & "' ", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
If rs.BOF And rs.EOF Then
Else
    While Not rs.EOF
        st1 = rs.Fields("phone").Value
        rs.MoveNext()
    End While
End If
'==== confirm receivers code ====
If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
rs.Open("select * from fundaccount where PIN = '" & k3 & "' ", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
If rs.BOF And rs.EOF Then
    txtMessage.Text = "Incorrect tranfer PIN, try again"
    txtPhone.Text = str1

    '===== save received sms =====
    If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
    rs.Open("Insert into recievedsms values ('" & "','" & str1 & "','" &
str2 & "','" & str3 & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)

    '=====send SMS to the sender =====
    cmdSendMsg_Click(sender, e)

    If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
    rs.Open("Insert into sentsms values ('" & "','" & txtPhone.Text & "','" &
txtMessage.Text & "','" & Now & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)
    txtMessage.Clear()
    txtPhone.Clear()
    str1 = ""
    str2 = ""
    str3 = ""
Exit Sub
Else
    While Not rs.EOF
        bal1 = rs.Fields("Balance").Value
        count = 1
        rs.MoveNext()
    End While
End If

'===== get balance from sender account =====
If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
rs.Open("select * from fundaccount where PIN = '" & k & "' ", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
If rs.BOF And rs.EOF Then
Else
    While Not rs.EOF
        bal = rs.Fields("balance").Value
        rs.MoveNext()
    End While
End If

```

```

'===== confirm sender PIN =====
If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
rs.Open("select * from createaccount where PinNum = '" & k & "' ", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
If rs.BOF And rs.EOF Then
    txtMessage.Text = "Pin Does not exist, try again"
    txtPhone.Text = str1

'===== save received sms =====
If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
rs.Open("Insert into recievedsms values ('" & "'",'" & str1 & "'", '" &
str2 & "'",'" & str3 & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)

'=====send SMS to the sender =====
cmdSendMsg_Click(sender, e)

If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
rs.Open("Insert into sentsms values ('" & "'",'" & txtPhone.Text & "'",
'" & txtMessage.Text & "'",'" & Now & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)
txtMessage.Clear()
txtPhone.Clear()
str1 = ""
str2 = ""
str3 = ""
Exit Sub
Else
While Not rs.EOF
    st = rs.Fields("Phone").Value
    rs.MoveNext()
End While

If Val(k2) > Val(bal) Then
    txtMessage.Text = "Insufficient fund"
    txtPhone.Text = str1
    '===== save received sms =====
    If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
    rs.Open("Insert into recievedsms values ('" & "'",'" & str1 & "'",
'" & str2 & "'",'" & str3 & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)

    '=====send SMS to the sender =====
    cmdSendMsg_Click(sender, e)

    If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
    rs.Open("Insert into sentsms values ('" & "'",'" & txtPhone.Text &
'", '" & txtMessage.Text & "'",'" & Now & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)
    txtMessage.Clear()
    txtPhone.Clear()
    str1 = ""
    str2 = ""
    str3 = ""
    Exit Sub
Else
    bal = Val(bal) - Val(k2)

```

```

        txtMessage.Text = "N" & k2 & " was debited from your account " &
k & " on " & Now & " your balance is " & "N" & bal
        txtPhone.Text = st

        '====debit creditors fund account =====
        str = Format(Now, "yyyy-MM-dd")
        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("Insert into fundaccount values ('" & "','" & k & "','"
& "','" & k2 & "','" & bal & "','" & str & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)

        '===== save received sms =====
        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("Insert into recievedsms values ('" & "','" & str1 & "','"
'" & str2 & "','" & str3 & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)

        '====send SMS to the sender =====
        cmdSendMsg_Click(sender, e)

        ' ===== save sent messages =====
        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("Insert into sentsms values ('" & "','" & txtPhone.Text &
'" & "','" & txtMessage.Text & "','" & Now & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)
        If count = 1 Then

            bal1 = Val(bal1) + Val(k2)
            txtMessage.Text = "N" & k2 & " was credited to your account "
& k3 & " on " & Now & " your balance is " & "N" & bal1
            txtPhone.Text = st1

            If rs.State = ADODB.ObjectStateEnum.adStateOpen Then
rs.Close()
                rs.Open("Insert into fundaccount values ('" & "','" & k3 &
'" & "','" & k2 & "','" & "','" & bal1 & "','" & str & "')", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)

                cmdSendMsg_Click(sender, e)
                '===== insert into sent SMS =====
                If rs.State = ADODB.ObjectStateEnum.adStateOpen Then
rs.Close()
                    rs.Open("Insert into sentsms values ('" & "','" &
txtPhone.Text & "','" & txtMessage.Text & "','" & Now & "')", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
                End If

                txtMessage.Clear()
                txtPhone.Clear()
                str1 = ""
                str2 = ""
                str3 = ""
                st = ""
                st1 = ""
            End If
        End If
        lblMsgCount.Text = "Deleting selected messages..."
        For i = lstInbox.Items.Count To 1 Step -1

```



```

        objSMS.Inbox.Message(i).Delete()
    Next
    lstInbox.Items.Clear()
    FillInboxList()
Else
    Exit Sub
End If
Catch ex As Exception
    MsgBox(ex.Message, MsgBoxStyle.Critical, strMyAppName)
Exit Try
End Try
End Sub

Private Sub lstInbox_SelectedIndexChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles lstInbox.SelectedIndexChanged

    End Sub

Private Sub txtSMSC_TextChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles txtSMSC.TextChanged

    End Sub

Private Sub txtPIN_TextChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles txtPIN.TextChanged

    End Sub

Private Sub PaymentHistoryToolStripMenuItem_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs)

    End Sub
End Class

Public Class home

    Private Sub picconfig_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles picconfig.Click
        frmMain.ShowDialog()
    End Sub

    Private Sub picconfig_MouseMove(ByVal sender As Object, ByVal e As
System.Windows.Forms.MouseEventHandler) Handles picconfig.MouseMove
        picconfig.BorderStyle = BorderStyle.FixedSingle
    End Sub

    Private Sub home_FormClosing(ByVal sender As Object, ByVal e As
System.Windows.Forms.FormClosingEventArgs) Handles Me.FormClosing
        Dim str As String = MsgBox("Are you sure you want to close the SMS Payment?",
vbYesNo, "Close APP")
        If str = vbNo Then
            e.Cancel = True
            Exit Sub
        Else
            End
        End If
    End Sub
End Class

```

```

    Private Sub home_Load(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles MyBase.Load
    ConnectDB()
    End Sub

    Private Sub home_MouseMove(ByVal sender As Object, ByVal e As
System.Windows.Forms.MouseEventHandler) Handles Me.MouseMove
    picconfig.BorderStyle = BorderStyle.None
    picpost.BorderStyle = BorderStyle.None
    pichelp.BorderStyle = BorderStyle.None
    End Sub

    Private Sub picpost_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles picpost.Click
    Post.ShowDialog()
    'Me.ShowInTaskbar = ShowIcon
    End Sub

    Private Sub picpost_MouseMove(ByVal sender As Object, ByVal e As
System.Windows.Forms.MouseEventHandler) Handles picpost.MouseMove
    picconfig.BorderStyle = BorderStyle.None
    picpost.BorderStyle = BorderStyle.FixedSingle
    End Sub

    Private Sub pichelp_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles pichelp.Click
    MsgBox("You can contact a technical support on" & vbCrLf & " +234 8064566560",
vbInformation, "Help")
    End Sub

    Private Sub pichelp_MouseMove(ByVal sender As Object, ByVal e As
System.Windows.Forms.MouseEventHandler) Handles pichelp.MouseMove
    pichelp.BorderStyle = BorderStyle.FixedSingle
    picpost.BorderStyle = BorderStyle.None
    End Sub

    Private Sub ToolTip1_Popup(ByVal sender As System.Object, ByVal e As
System.Windows.Forms.PopupEventArgs) Handles ToolTip1.Popup

    End Sub

End Class

Option Strict Off
Option Explicit On
Module ModSMS
    Public db As ADODB.Connection
    Public rs As ADODB.Recordset

    Public con As New ADODB.Connection
    Public Sub ConnectDB()
        On Error GoTo hell
        db = New ADODB.Connection
        rs = New ADODB.Recordset
        With db

```

```

        .Mode = ADODB.ConnectModeEnum.adModeReadWrite
        .CursorLocation = ADODB.CursorLocationEnum.adUseClient
        'for server use LOCALHOST or IP address here 127.0.0.1
        .Open("DRIVER={MySQL ODBC 5.1
Driver};SERVER=127.0.0.1;PORT=3306;DATABASE=SMSPayment;USER=root;PASSWORD='';OPTION=3;")

        End With
        con = db
        Exit Sub
hell:
    MsgBox(Err.Description, MsgBoxStyle.Critical + MsgBoxStyle.OkOnly)
    If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
    If db.State = ADODB.ObjectStateEnum.adStateOpen Then db.Close()
End Sub
End Module

Public Class Post

    Private Sub Post_Load(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles MyBase.Load

        End Sub

    Private Sub p1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles p1.Click
        Me.Close()

        End Sub

    Private Sub p1_MouseMove(ByVal sender As Object, ByVal e As
System.Windows.Forms.MouseEventHandler) Handles p1.MouseMove
        p1.BorderStyle = BorderStyle.FixedSingle
        p2.BorderStyle = BorderStyle.None
        p3.BorderStyle = BorderStyle.None
    End Sub

    Private Sub p2_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles p2.Click
        g1.Visible = True
        g2.Visible = False
    End Sub

    Private Sub p2_MouseMove(ByVal sender As Object, ByVal e As
System.Windows.Forms.MouseEventHandler) Handles p2.MouseMove
        p1.BorderStyle = BorderStyle.None
        p2.BorderStyle = BorderStyle.FixedSingle
        p3.BorderStyle = BorderStyle.None
    End Sub

    Private Sub p3_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles p3.Click
        g1.Visible = False
        g2.Visible = True
    End Sub

    Private Sub p3_MouseMove(ByVal sender As Object, ByVal e As
System.Windows.Forms.MouseEventHandler) Handles p3.MouseMove
        p1.BorderStyle = BorderStyle.None

```

```

p2.BorderStyle = BorderStyle.None
p3.BorderStyle = BorderStyle.FixedSingle
End Sub

```

```

Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles Button2.Click
    tb1.Clear()
    tb1.Focus()
    tb2.Clear()
    tb3.Clear()
    tb5.Clear()
    tb6.Clear()
    tb7.Clear()
    tb8.Clear()
    tb9.Clear()
    Button1.Text = "Fund Account"

```

```
End Sub
```

```

Private Sub b1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles b1.Click
    t1.Clear()
    t1.Focus()
    t2.Clear()
    t3.Clear()
    t4.Text = "Select"
    t5.Text = "Select"
    b2.Text = "Create Account"
    t6.Clear()

```

```
End Sub
```

```
Dim PiNum As Integer = 1201007890 : Dim Num As Integer
```

```

Private Sub b2_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles b2.Click

    If b2.Text = "Update" Then
        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("UPDATE createaccount SET ID = '" & lbl.Text & "', LastName= '" &
t1.Text & "', FirstName= '" & t2.Text & "', AccountNo = '" & t3.Text & "', AccountType =
'" & t4.Text & "', Bank = '" & t5.Text & "', PinNum = '" & lblnum.Text & "', Phone = '" &
t6.Text & "' where ID = '" & lbl.Text & "'", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)
        MsgBox("Record updated", MsgBoxStyle.Information, "Update Record")
    Else
        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("select * from createaccount ", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
        If rs.RecordCount > 0 Then
            While Not rs.EOF
                Num = Val(rs.Fields("PinNum").Value) + 1
                rs.MoveNext()
            End While
        Else
            Num = PiNum
        End If

        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()

```

```

        rs.Open("Insert into createaccount values (' & "','" & t1.Text & "','" &
t2.Text & "','" & t3.Text & "','" & t4.Text & "','" & t5.Text & "','" & Num & "','" &
& t6.Text & "')", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)
        MsgBox("Account successfully created, copy your PIN and keep it secret" &
vbCrLf & vbCrLf & "[Your PIN: " & Num & "]", MsgBoxStyle.Information, "SMS Payment")
    End If
    t1.Clear()
    t1.Focus()
    t2.Clear()
    t3.Clear()
    t4.Text = "Select"
    t5.Text = "Select"
    b2.Text = "Create Account"
    t6.Clear()
End Sub
Dim dt As Date
Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles Button1.Click
    Dim str As String
    str = Format(Now, "yyyy-MM-dd")

    If tb7.Text = "" Then
        MsgBox("You must fund account", vbCritical, "Fund Account")
        tb7.Focus()
        Exit Sub
    End If

    If Button1.Text = "Update" Then
        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("Insert into fundaccount values (' & "','" & tb1.Text & "','" & "','" &
,'" & tb7.Text & "','" & tb8.Text & "','" & str & "')", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
        'rs.Open("UPDATE fundaccount SET ID = '" & lbl2.Text & "','" & PIN = '" &
tb1.Text & "','" & Credit = '" & "','" & Debit = '" & tb7.Text & "','" & Balance = '" & tb8.Text &
,'" & dyte = '" & str & "'" WHERE ID= '" & lbl2.Text & "'", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
        MsgBox("Record updated", MsgBoxStyle.Information, "Update Record")
    Else

        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("Insert into fundaccount values (' & "','" & tb1.Text & "','" & "','" &
tb7.Text & "','" & "','" & tb8.Text & "','" & str & "')", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
        MsgBox("Account successfully funded", MsgBoxStyle.Information, "SMS App")
    End If
    Button1.Text = "Fund Account"
    tb1.Clear()
    tb1.Focus()
    tb2.Clear()
    tb3.Clear()
    tb5.Clear()
    tb6.Clear()
    tb7.Clear()
    tb8.Clear()
    tb9.Clear()
End Sub

```

```

Private Sub SearchToolStripMenuItem_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles SearchToolStripMenuItem.Click
    Dim str As String = InputBox("Enter PIN to search", "Account Search", vbOKCancel)
    If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
    rs.Open("select * from createaccount where PinNum = '" & str & "'", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
    If rs.BOF And rs.EOF Then
        MsgBox("No data available, try again")
        Exit Sub
    Else
        While Not rs.EOF
            lbl.Text = rs.Fields("ID").Value
            t1.Text = rs.Fields("LastName").Value
            t2.Text = rs.Fields("FirstName").Value
            t3.Text = rs.Fields("AccountNo").Value
            t4.Text = rs.Fields("AccountType").Value
            t5.Text = rs.Fields("Bank").Value
            lblnum.Text = rs.Fields("PinNum").Value
            rs.MoveNext()
            b2.Text = "Update"
        End While
    End If

```

```
End Sub
```

```

Private Sub ToolStripMenuItem2_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles ToolStripMenuItem2.Click
    On Error Resume Next
    Dim str As String = InputBox("Enter PIN to search", "Search PIN", vbOKCancel)
    If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
    rs.Open("select * from createaccount where PinNum = '" & str & "'", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
    If rs.BOF And rs.EOF Then
        MsgBox("No data available, try again")
        Exit Sub
    Else
        While Not rs.EOF
            tb2.Text = rs.Fields("LastName").Value
            tb3.Text = rs.Fields("FirstName").Value
            tb5.Text = rs.Fields("AccountNo").Value
            tb6.Text = rs.Fields("AccountType").Value
            rs.MoveNext()
            Button1.Text = "Update"
        End While
    End If

```

```

If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
rs.Open("Select * from fundaccount where PIN = '" & str & "'", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)

```

```

If rs.BOF And rs.EOF Then
    tb9.Text = 0
    Exit Sub
Else

```

```

        While Not rs.EOF
            tb1.Text = rs.Fields("PIN").Value
            lbl2.Text = rs.Fields("ID").Value
            tb9.Text = Val(rs.Fields("Balance").Value)
            lbl1.Text = rs.Fields("dyte").Value
            rs.MoveNext()
        End While
    End If

End Sub

Private Sub ToolStripMenuItem1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles ToolStripMenuItem1.Click
    On Error Resume Next
    View.Text = "View Account"
    View.gbx.Visible = True
    View.gbx2.Visible = False
    View.lst.Clear()
    With View.lst
        .View = System.Windows.Forms.View.Details
        .Columns.Add("S/N", 60, HorizontalAlignment.Left)
        .Columns.Add("PIN", 100, HorizontalAlignment.Left)
        .Columns.Add("Credit", 100, HorizontalAlignment.Left)
        .Columns.Add("Debit", 100, HorizontalAlignment.Left)
        .Columns.Add("Balance", 100, HorizontalAlignment.Left)
        .Columns.Add("Date", 100, HorizontalAlignment.Left)
    End With
    Dim arr(6) As String
    Dim itm As ListViewItem

    If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
    rs.Open("select * from fundaccount", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)
    If rs.BOF And rs.EOF Then
    Else
        While Not rs.EOF
            arr(0) = View.lst.Items.Count + 1
            arr(1) = rs.Fields("PIN").Value
            arr(2) = rs.Fields("Credit").Value
            arr(3) = rs.Fields("Debit").Value
            arr(4) = rs.Fields("Balance").Value
            arr(5) = rs.Fields("dyte").Value
            itm = New ListViewItem(arr)
            View.lst.Items.Add(itm)
            rs.MoveNext()
            View.lst.Refresh()
        End While
        View.ShowDialog()
    End If
End Sub

Private Sub ViewToolStripMenuItem_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles ViewToolStripMenuItem.Click
    On Error Resume Next
    View.Text = "View Account created"
    View.gbx2.Visible = True
    View.gbx.Visible = False
    View.lst.Clear()

```

```

With View.lst
    .View = System.Windows.Forms.View.Details
    .Columns.Add("S/N", 60, HorizontalAlignment.Left)
    .Columns.Add("Last Name", 100, HorizontalAlignment.Left)
    .Columns.Add("First Name", 100, HorizontalAlignment.Left)
    .Columns.Add("Account No", 100, HorizontalAlignment.Left)
    .Columns.Add("Account Type", 100, HorizontalAlignment.Left)
    .Columns.Add("PIN", 100, HorizontalAlignment.Left)
    .Columns.Add("Phone", 100, HorizontalAlignment.Left)
End With
Dim arr(7) As String
Dim itm As ListViewItem

If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
rs.Open("select * from createaccount", db, ADODB.CursorTypeEnum.adOpenDynamic,
ADODB.LockTypeEnum.adLockPessimistic)
If rs.BOF And rs.EOF Then
Else
    While Not rs.EOF
        arr(0) = View.lst.Items.Count + 1
        arr(1) = rs.Fields("LastName").Value
        arr(2) = rs.Fields("FirstName").Value
        arr(3) = rs.Fields("AccountNo").Value
        arr(4) = rs.Fields("AccountType").Value
        arr(5) = rs.Fields("PinNum").Value
        arr(6) = rs.Fields("Phone").Value
        itm = New ListViewItem(arr)
        View.lst.Items.Add(itm)
        rs.MoveNext()
        View.lst.Refresh()
    End While
    View.ShowDialog()
End If
End Sub

Private Sub t2_TextChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles t2.TextChanged

End Sub

Private Sub Label12_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles Label12.Click

End Sub

Private Sub t1_TextChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles t1.TextChanged

End Sub

Private Sub Label11_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles Label11.Click

End Sub

Private Sub g2_Enter(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles g2.Enter

```


End Sub

```

Private Sub tb1_KeyPress(ByVal sender As Object, ByVal e As
System.Windows.Forms.KeyPressEventArgs) Handles tb1.KeyPress
    If e.KeyChar = Microsoft.VisualBasic.ChrW(Keys.Return) Then
        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("select * from createaccount where PinNum = '" & tb1.Text & "'", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
        If rs.BOF And rs.EOF Then
            MsgBox("No data available, try again")
            Exit Sub
        Else
            While Not rs.EOF
                tb1.Text = rs.Fields("ID").Value
                tb2.Text = rs.Fields("LastName").Value
                tb3.Text = rs.Fields("FirstName").Value
                tb5.Text = rs.Fields("AccountNo").Value
                tb6.Text = rs.Fields("AccountType").Value
                rs.MoveNext()
                'tb2.Text = "Update"
            End While
        End If

        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("Select * from fundaccount where PIN = '" & tb1.Text & "'", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)

        If rs.BOF And rs.EOF Then
            tb9.Text = 0
            Exit Sub
        Else
            While Not rs.EOF
                tb9.Text = Val(rs.Fields("Balance").Value)
                rs.MoveNext()
            End While
        End If

    End If
End Sub

```

```

Private Sub tb1_TextChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles tb1.TextChanged

```

End Sub

```

Private Sub tb7_TextChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles tb7.TextChanged
    If Button1.Text = "Fund Account" Then
        tb8.Text = Val(tb9.Text) + Val(tb7.Text)
    Else
        tb8.Text = Val(tb9.Text) - Val(tb7.Text)
    End If
End Sub

```

```

Private Sub tb6_TextChanged_1(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles tb6.TextChanged

```

```

End Sub

End Class
Public Class View

    Private Sub t1_Click(ByVal sender As Object, ByVal e As System.EventArgs) Handles
t1.Click

        End Sub

        Private Sub t1_SelectedIndexChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles t1.SelectedIndexChanged
            If t1.Text = "PIN" Then
                With t2
                    .Text = "Enter PIN code here"
                    .ForeColor = Color.DarkKhaki
                    Label1.Visible = False
                End With
            ElseIf t1.Text = "Date" Then
                With t2
                    .Text = "Enter Date here"
                    Label1.Visible = True
                    .ForeColor = Color.DarkKhaki
                End With
            End If
        End Sub

        Private Sub t2_GotFocus(ByVal sender As Object, ByVal e As System.EventArgs) Handles
t2.GotFocus
            t2.Clear()
            t2.ForeColor = Color.Black
        End Sub

        Private Sub t2_KeyPress(ByVal sender As Object, ByVal e As
System.Windows.Forms.KeyPressEventArgs) Handles t2.KeyPress
            If e.KeyChar = Microsoft.VisualBasic.ChrW(Keys.Return) Then
                btnview_Click(sender, e)
            End If
        End Sub

        Private Sub t2_TextChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles t2.TextChanged

        End Sub

        Private Sub btnview_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles btnview.Click
            On Error Resume Next
            Me.Text = "View Accounts funded"
            Me.lst.Clear()
            With Me.lst
                .View = System.Windows.Forms.View.Details
                .Columns.Add("S/N", 60, HorizontalAlignment.Left)
                .Columns.Add("PIN", 100, HorizontalAlignment.Left)
                .Columns.Add("Credit", 100, HorizontalAlignment.Left)
                .Columns.Add("Debit", 100, HorizontalAlignment.Left)
            End With
        End Sub
    End Class

```

```

        .Columns.Add("Balance", 100, HorizontalAlignment.Left)
        .Columns.Add("Date", 100, HorizontalAlignment.Left)
    End With
    Dim arr(6) As String
    Dim itm As ListViewItem
    If t1.Text = "PIN" Then
        If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
        rs.Open("select * from fundaccount WHERE PIN = '" & t2.Text & "'", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
        If rs.BOF And rs.EOF Then
            Else
                While Not rs.EOF
                    arr(0) = Me.lst.Items.Count + 1
                    arr(1) = rs.Fields("PIN").Value
                    arr(2) = rs.Fields("Credit").Value
                    arr(3) = rs.Fields("Debit").Value
                    arr(4) = rs.Fields("Balance").Value
                    arr(5) = rs.Fields("dyte").Value
                    itm = New ListViewItem(arr)
                    Me.lst.Items.Add(itm)
                    rs.MoveNext()
                    Me.lst.Refresh()
                End While
            End If
        ElseIf t1.Text = "Date" Then
            If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
            rs.Open("select * from fundaccount WHERE Dyte = '" & t2.Text & "'", db,
ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
            If rs.BOF And rs.EOF Then
                Else
                    While Not rs.EOF
                        arr(0) = Me.lst.Items.Count + 1
                        arr(1) = rs.Fields("PIN").Value
                        arr(2) = rs.Fields("Credit").Value
                        arr(3) = rs.Fields("Debit").Value
                        arr(4) = rs.Fields("Balance").Value
                        arr(5) = rs.Fields("dyte").Value
                        itm = New ListViewItem(arr)
                        Me.lst.Items.Add(itm)
                        rs.MoveNext()
                        Me.lst.Refresh()
                    End While
                End If
            End If
        End Sub

    Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles Button1.Click
    On Error Resume Next
    Me.lst.Clear()
    With Me.lst
        .View = System.Windows.Forms.View.Details
        .Columns.Add("S/N", 60, HorizontalAlignment.Left)
        .Columns.Add("Last Name", 100, HorizontalAlignment.Left)
        .Columns.Add("First Name", 100, HorizontalAlignment.Left)
        .Columns.Add("Account No", 100, HorizontalAlignment.Left)
        .Columns.Add("Account Type", 100, HorizontalAlignment.Left)
    End With

```

```
        .Columns.Add("PIN", 100, HorizontalAlignment.Left)
    End With
    Dim arr(6) As String
    Dim itm As ListViewItem

    If rs.State = ADODB.ObjectStateEnum.adStateOpen Then rs.Close()
    rs.Open("select * from createaccount WHERE AccountType = '" & cb1.Text & "'",
    db, ADODB.CursorTypeEnum.adOpenDynamic, ADODB.LockTypeEnum.adLockPessimistic)
    If rs.BOF And rs.EOF Then
    Else
        While Not rs.EOF
            arr(0) = lst.Items.Count + 1
            arr(1) = rs.Fields("LastName").Value
            arr(2) = rs.Fields("FirstName").Value
            arr(3) = rs.Fields("AccountNo").Value
            arr(4) = rs.Fields("AccountType").Value
            arr(5) = rs.Fields("PinNum").Value
            itm = New ListViewItem(arr)
            Me.lst.Items.Add(itm)
            rs.MoveNext()
            Me.lst.Refresh()
        End While
    End If
End Sub

Private Sub lst_SelectedIndexChanged(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles lst.SelectedIndexChanged

End Sub
End Class
```

APPENDIX B: SCREEN SHOT DEMO



Fig 4.4: Mobile Payment System Home Page

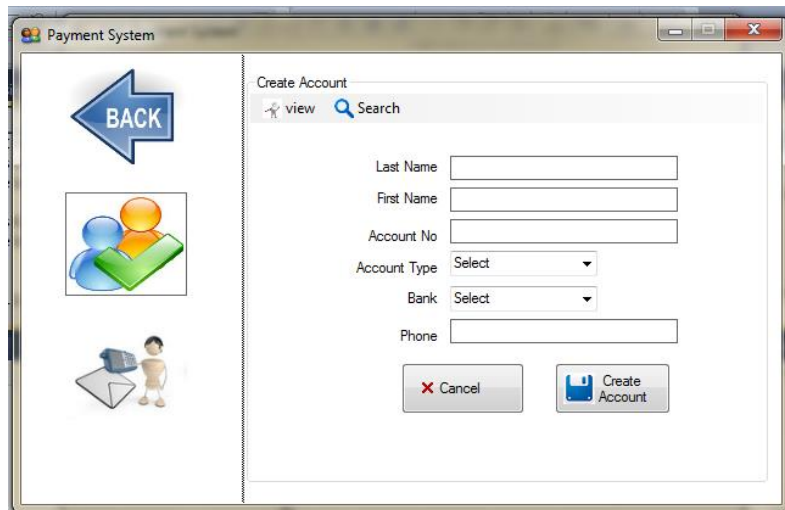


Fig 4.5: Mobile Payment System Create Account Page

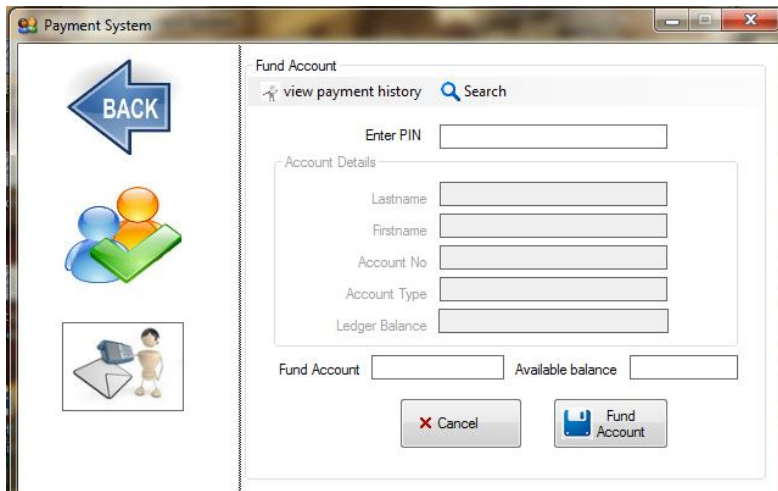


Fig 4.6: Mobile Payment System Fund Account Page

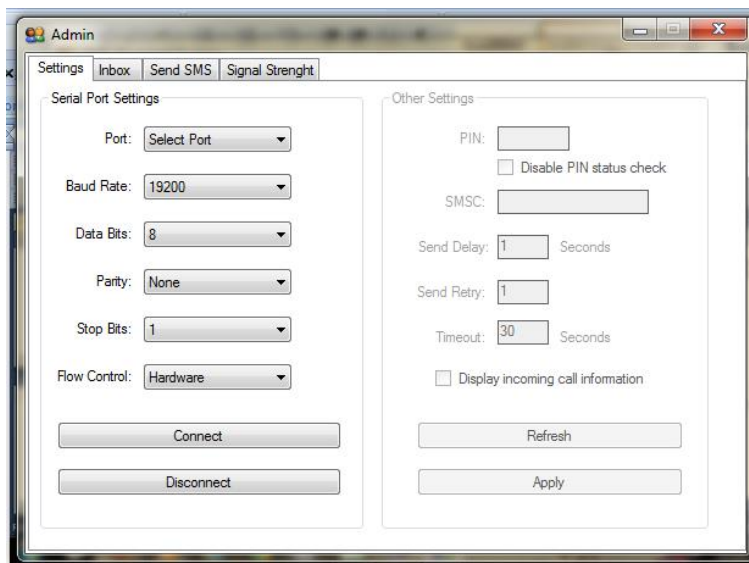


Fig 4.7: Mobile Payment System Configuration(Settings) Page

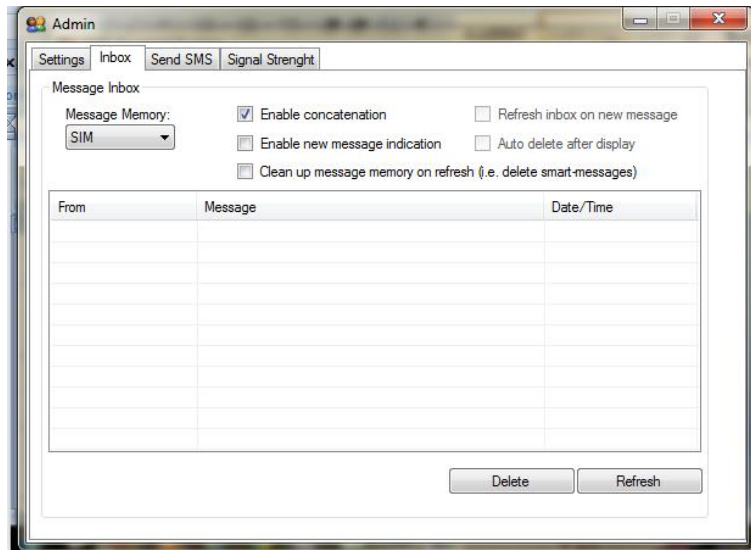


Fig 4.8: Mobile Payment System Inbox Page

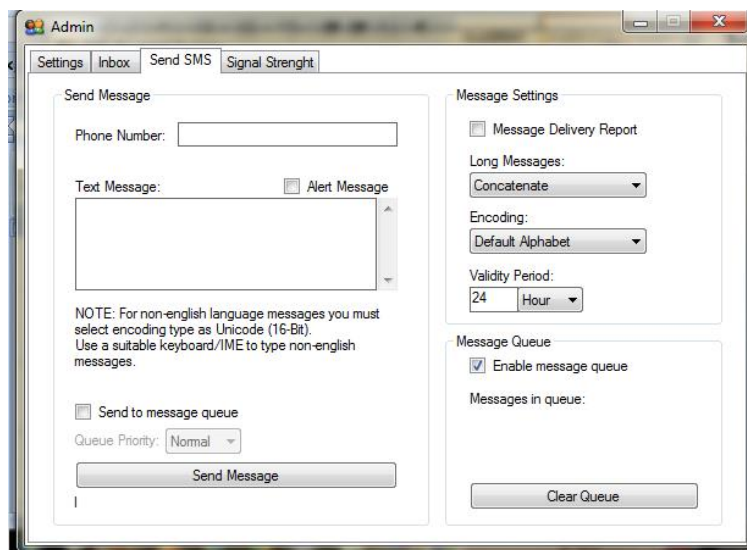


Fig 4.9: Mobile Payment System Send SMS Page

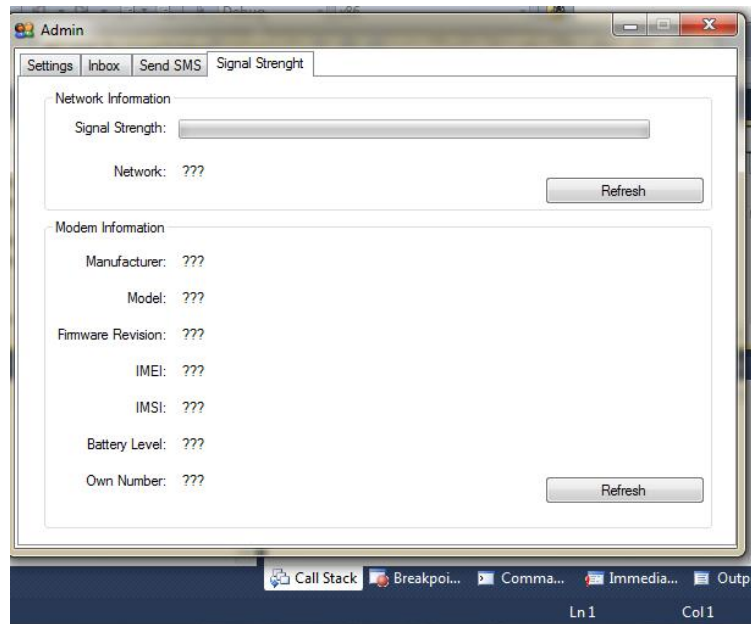


Fig 4.10: Mobile Payment System Signal Strength Page

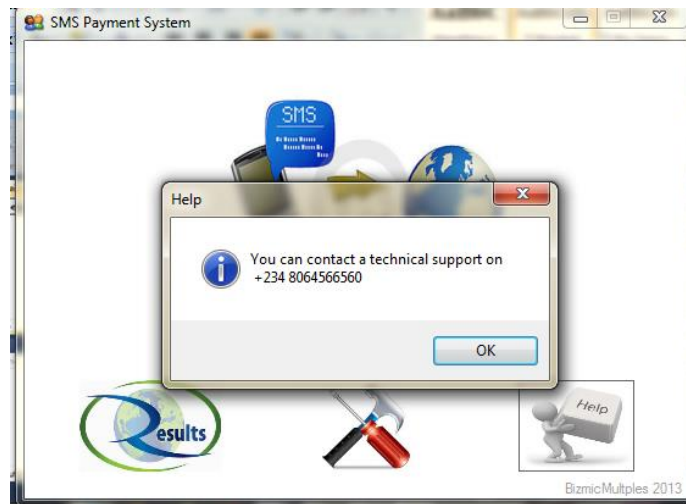


Fig 4.11: Mobile Payment System Send Help Page

