# THESIS 1

# AN ELECTRONIC TRUST FRAMEWORK FOR GRASS ROOT PRIVITIZATION OF UTILITY BILLS COLLECTION

**Submitted to**
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# DEDICATION

To my Mama Papa,

who are always, source of inspiration for me

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# ABSTRACT

This thesis describes the author's vision for streamlining utility bills collection in Pakistan.

The need of a liable technology based framework for utility bill collection fitting for our socio economical conditions is described in this thesis. This report offers a scalable way out to match collection requirements on community-by-community basis. Any public subscriber of the utility service living in urban or rural areas should be able to pay utility bills, through a well located channel, whenever it is convenient to him. The application of web-based services in bill collection industry to achieve authentic, reliable, non-repudiated and scalable system is discussed in details. With the aid of privatization and trust relationship, the proposed system would mitigate the weaknesses of current system.

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## Abbreviations and Acronyms

| | |
|---|---|
| NADRA | National Database and Registration Authority |
| NIC | National Identity Card |
| ATM | Automated Teller Machine |
| CNIC | Computerized National Identity Card |
| GPO | General Post Office |
| TPS | Transactions per second |
| ASP | Active Server Pages |
| PHP | Hypertext Preprocessor |
| JSP | Java Server Pages |
| HTML | Hypertext Markup Language |
| MSDN | Microsoft Developer Network |
| GUI | Graphical User Interfaces |
| IIS | Internet Information Services |

*Part I*

# Getting Started

*Chapter 1*
Introduction

# INTRODUCTION

In addition to the commercial ramifications in utility bill collection, it is a public issue. At the behest of government, efforts have been made by different organizations (State Bank, NADRA, Pakistan Post Office and Mobilink Genie) to reprieve the drudgery of utility consumers. However, a large part of community, predominantly in middle as well as in lower class localities, bill collection is still a gigantic problem. It is so because the improvements made so far are of tactical nature and the basic work model remains unchanged.

This project proposes the use of Client – Server technology to franchise bill collection to local small businesses through Internet Bank Accounts. The Secure Socket Layer will secure data in transit between the utility-bill-collection company, the bank and franchisee. The standard based new technology, Web Services [1], will facilitate platform independent publishing, searching and binding [2] to utility-bill-collection company's web service. Web Services would encourage service binding to bank's secure server. Web Service is designed to encourage reusability and provide interoperable machine-to-machine interaction over the network [3]. A very strong authentication algorithm based on digital signatures would control access to the web service.

## 1.1 Project Objectives

To streamline the activity, following objectives are set for any future utility bills collection system:

1. Provide relief to utility consumers by introducing a smooth payment procedure.
2. Focus on every section of society.

3. Release burden of front-end customer handling from the banks and utility companies.
4. Provide scalability in front-end customers handling. It should respond to the market demand of collection points and their opening times.
5. Provide accountability of all functionaries involved in the collection procedure.
6. Develop a solution which is economical, secure and easy to implement.
7. Create employment if possible.

***Part II***

# Requirements Engineering

# BILLS COLLECTION LANDSCAPE

# & LOGICAL VIEW

Until the end of 1999, utility bills collection has been done through intervention of State Bank of Pakistan. Subsequently, due to the demand of people, involvement of government and day-by-day growing population of Pakistan, advancements in this procedure started. Not only state bank changed its policies, Pakistan post office was also authorized to collect bills at nominal charges. NADRA has been drawn in operate ATM based “e-Sahulat” based on consumer’s NIC number [4][5], since the beginning of 2008. Mobilink introduced, Mobilink Genie, based on account numbers of its subscribers [6]. Based on self-help, most of the people started using services of unofficial bills payment agents.

In this chapter, the logical view of the system describes the provided functionality of the existing utility bill collection system. Data flow diagram, a logical view of the system, strongly illustrates the relationship of processes, data stores and external entities in existing utility bill collection system.

## 2.1 Recent Developments

The sections below describe these initiatives. Decomposition diagram, given at figure 1, describes the high-level process decomposition into lower level more detailed components.

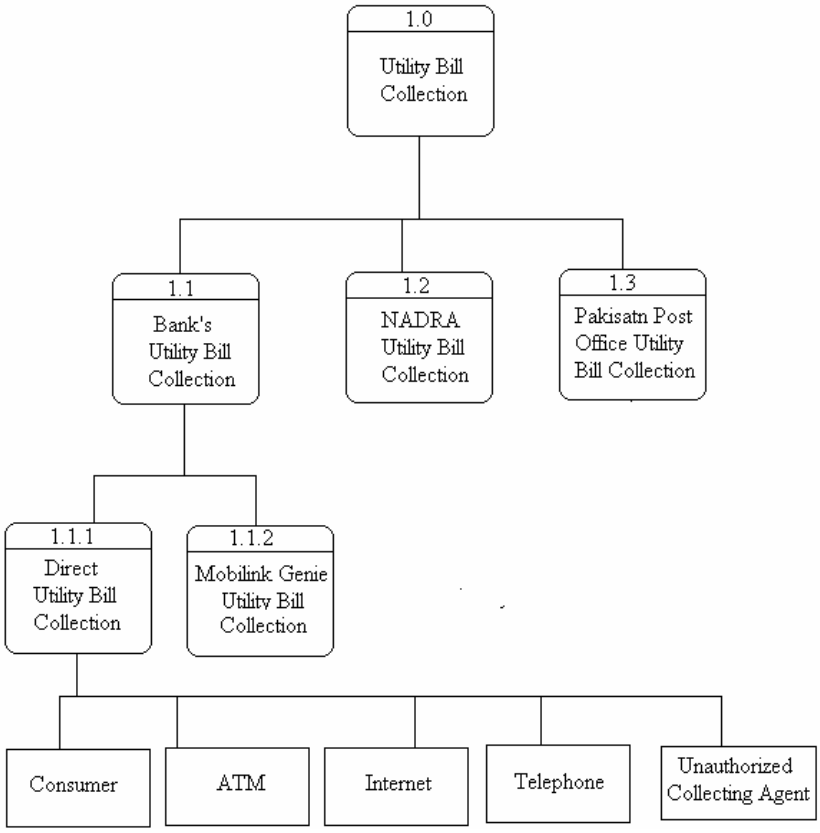


**Figure 1: Decomposition Diagram of Utility Bill Collection**

### 2.1.1 Bank's Bills Collection Scheme

Taking cognizance of growth of the private banks and improvements in technology, all commercial banks (both in public and in private sector) are allowed to collect utility bills [7].

**Direct Utility Bill Collection**

Consumer can not only pay bill himself or through cheque [7] or he can pay bill by adopting any of the following means of bill collection, as shown in figure 2:

**1. ATM Utility Bill Collection**

The banks having ATM facility are allowed to enter into agreements with the utility companies for collection through ATM [7].

**2. Internet Utility Bill Collection**

Banks have been directed to arrange with the utility companies for payment of bills through Internet [7].

**3. Telephonic Utility Bill Collection**

Banks are allowed to collect utility bills from their customers on telephone.

**4. Unauthorized Collecting Agent Utility Bill Collection**

Several urban communities have unendorsed mechanisms to aid consumers, to pay utility bills. For instance, shopkeepers collect bills from their neighboring customers at petite charge. They have unofficial procedures with banks, where bills in conjunction with bank scroll is submitted to the bank staff, which hand back receipts later after depositing the cash in the bank. Consumers pay a charge for this collusion. Local shopkeeper gets remuneration, which may be diminutive but is okay to give. The bank staff gets part of their routine work done by the shopkeepers. However, this is an unhealthy banking practice.

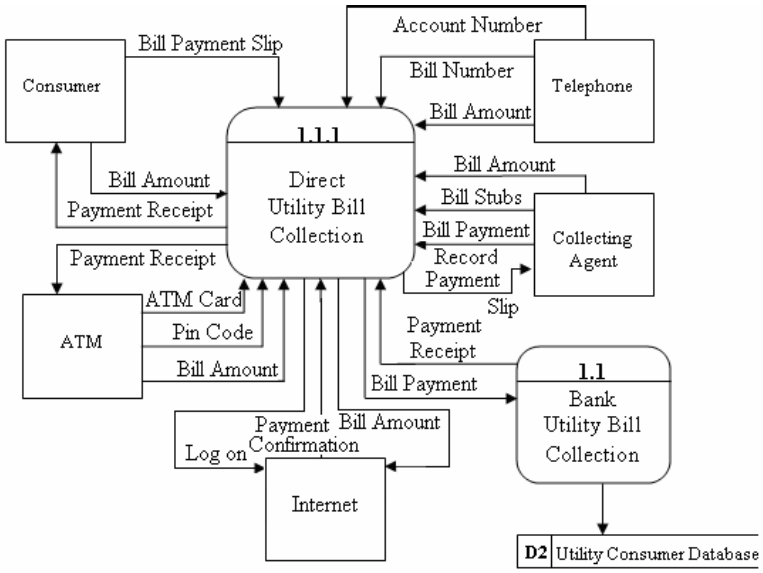


**Figure 2: Data Flow diagram of Bank's Utility Bill Collection**

**Indirect Utility Bill Collection**

**1. Mobilink Genie**

In June 2008, Mobilink introduced Mobilink Genie – Pakistan's first service to offer the comfort and ease of paying bills, through mobile. Jazz and indigo customers can subscribe this by sending SMS to 1610 [8][9][10]. To activate service Jazz customers will pay 100 Rs.+ tax per year and indigo customers will pay 10 Rs. + tax per month [11]. By sending message to 1610 user gets a link to Genie software on his mobile [8]. To install this software customer must activate GPRS first then visit site and install the software. Mobilink Genie ties customer's Credit Card and Bank Account to her mobilink connection. Its recent partners are CitiBank credit card, KASB Bank, Adamjee insurance and Atlas Bank. After the payment customer gets Transaction ID on his mobile based on which he can verify his payment from banks also. This process is shown in figure 3.

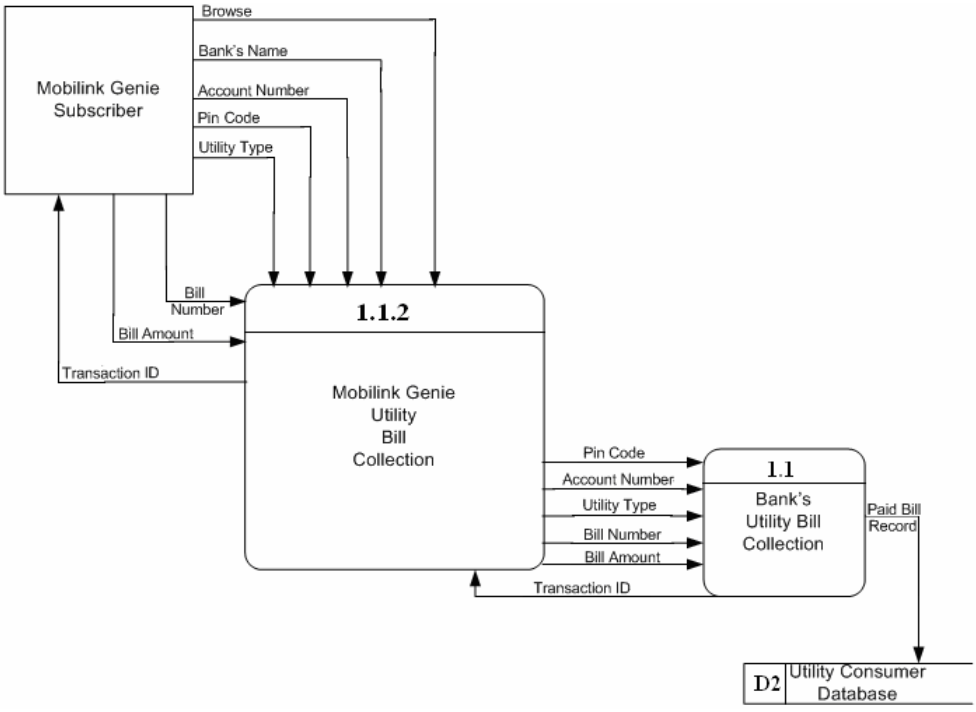


**Figure 3: Data Flow Diagram of Mobilink Genie Utility Bill Collection**

### 2.1.2 NADRA'S e-Sahulat

Built on the existing technologies of Biometric identification and Online Verification, NADRA has developed e-Sahulat for bill payment. e-Sahulat enables users to securely access personal accounts and pay their utility bills to a host of bills including Sui Gas, Electricity and Telephone by using Computerized National Identity Card (CNIC) as ATM cards [12]. To activate e-Sahulat, franchisee of kiosk is being offered to young educated youth as well as small businesspersons. Any franchisee having DIAL Up or WLL internet connection can apply for NADRA Kiosk. Franchisee has to provide refundable cash security amounting Rs.150, 000 to NADRA [13]. NADRA will then award Franchisee License to selected Franchisee at a cost of Rs.50, 000 [13]. Kiosk sites will be developed as per the specified standards given by NADRA. Franchisee will bear the site development cost (likely average cost Rs.75, 000) [13]. Currently this service is facilitating in cities like Karachi, Lahore, Faisalabad, Multan, Gujranwala, Rawalpindi.

Kiosk is fabricated in persona of an ATM, enabling the user to pay their utility bills using cash as the payment instrument. At Kiosk customer can pay utility bills as shown in figure 4. They can also buy pin codes for scratch cards besides using online CNIC verification facility. Payments are made by inserting directly into KIOSK cash acceptor. Once the cash is accepted, receipt is issued to the customer.

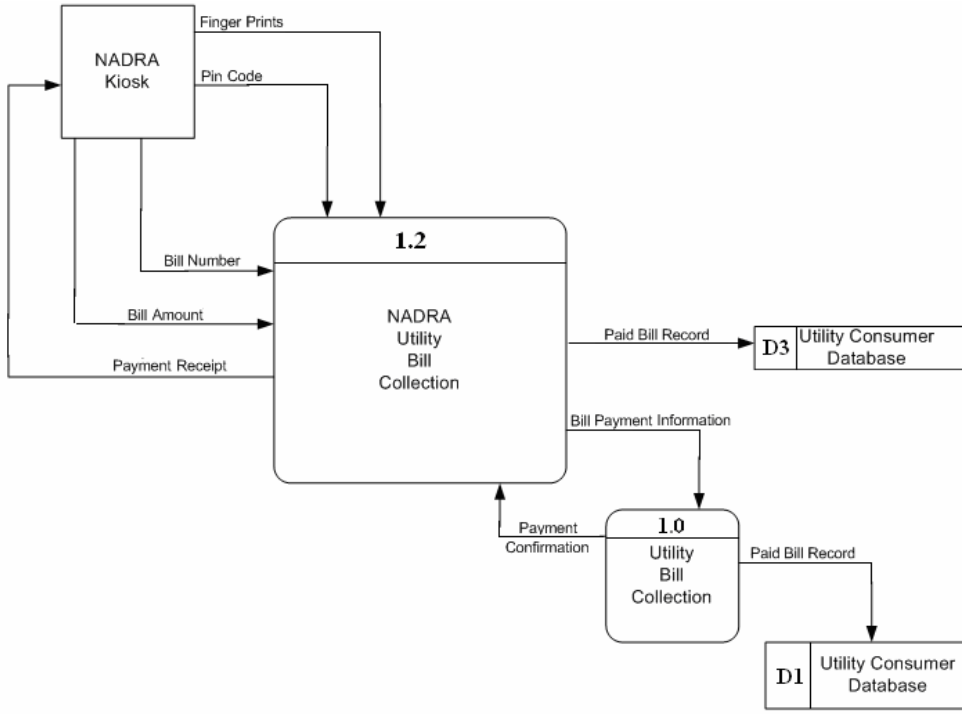


**Figure 4: Data Flow Diagram of NADRA Utility Bill Collection**

### 2.1.3 Pakistan Post Office Scheme

Pakistan post has a large network of outlets throughout Pakistan for collection of utility bills in order to facilitate consumers from all walks of life. The Day Post Offices collect electricity, telephone and gas bills (as shown in figure 5) from 9:00 AM to 4:00 PM. whereas, all GPOs, and Night Post Offices offer this facility from 9:00 AM to 9:00 PM. On Friday, prayer and lunch break is observed from 12:30 PM to 3:00 PM [14]. Pakistan Post Office introduced a new service, Utility Bills Payment (Gas and Telephone), at the customer's doorsteps through cross cheque at the cost of Rs.20/bill to be paid by the consumer [15]. This facility is available to both, domestic as well as commercial, consumers. The consumers are required to handover the utility bill to the Postman of their locality alongwith a crossed cheque by the due date. Postman on collection of the cheque, shall acknowledge the payment by stamping and