

# Augmenting Financial Inclusion through Mobile Phone Using USSD Application

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**Abstract-**The main objective of this project is to provide free banking services through USSD application on a basic mobile phone without use of internet which will be helpful mainly for tribal and hill station people. In Hill station and tribal areas, unavailability of ATM leads people to depend on 'BC' persons to transact money from banks. But the BC person visits people only once or twice in a week and people cannot contact them instantly. So the drawback is, those people cannot transact money instantly. Although USSD system exists in some banks, it provides only limited services through USSD in only TRS, while regional languages and IVRS are not available. In proposed system, this USSD code service can be used to access additional banking services through both TRS and IVRS modules. The modules used in proposed system are USSD Code generation Module, Interface Module, Database Repository Module, Transactions Module such as IVRS- Integrated Voice Response System and TRS- Transaction Response System. User's voice and 25 questions for security and login settings will be registered initially. By accessing the USSD code, people can select their regional language and provide account details, and after few seconds they will get a call from bank asking for password match in voice keyword and to answer any three random questions from the 25 registered questions. The successful login then proceeds to access services. The proposed system is toll free with regional languages options, additional banking services and IVRS facilities. Hence by implementing this system, people can instantly do their money transfer, bill payment, top up and contact BC persons easily. Only mobile phone with GSM network is enough for this application. No internet connection is required. No charges are applicable for the transaction. The BC person's time for delivering cash is also reduced to 1 day. The regional language service in IVRS will be very useful to hill station and tribal people who contacts only orally and does not have authorized symbols in their language for TRS.

**Index Terms:** *Financial inclusion, USSD application, Business Correspondent (BC) services*

## I INTRODUCTION

Objective is to provide free financial services using mobile phone through USSD application for hill station people mainly. In Hill station areas, since there is no ATM, people depend only on 'BC' persons to transact and withdraw their money from banks [2]. But the BC persons visits people only once or twice in a week and in other days people has to contact BC persons through their area representative. Hill station people cannot transact money instantly [1]. In Existing system, the banks like SBI, ICICI provides only limited services through USSD like balance enquiry, last 5 transactions, top up and fund transfer. Till now USSD codes are used to check mobile phone balance, customer care and other services [3]. This service is available only in TRS facilities. In proposed system, this USSD code service can also be used to access additional banking services through TRS and IVRS [5]. For this service, an account should be created by registering user's voice and 25 questions with their unique answers for security settings. After registering, by dialing the USSD code hill station people can select their regional language as they don't know English. After selecting language and providing account details, within few seconds they will get a call from bank asking for password match in voice keyword and to answer any three random questions from that 25 registered question. On successful login, people can proceed to access service otherwise the service will be denied.

## II RELATED WORK

### A. Interactive Voice Response

Interactive Voice Response service only operates through specified numbers that banks advertise to their clients. Clients make a call at the Interactive Voice Response number and are usually information stored in bank database. Client selected the pre-specified number in their GSM mobile [7].

### B. Short Messaging Service

Short Messaging Service uses the popular text message to enable mobile application based banking. User can sending information through an SMS gateway [7]. The Services provider responds with a reply through pre specified number.

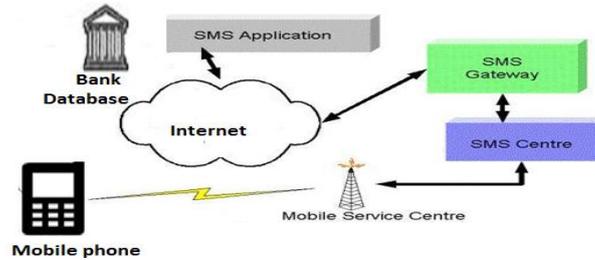


Figure: SMS Architecture

### C. Wireless Access Protocol

Wireless Access Protocol uses a similar to the Internet banking. Banks mainly maintain a Wireless Access Protocol sites, customer's access WAP browser. WAP browser are very secure and effectively compare to other sites. GSM users can easily use the bank's website through the WAP browser [8].

### D. Mobile Application

Applications are suitable to deployed complex banking transactions. In mobile applications implemented is secure communication with point-to-point encryption [9].

### E. Tool Kit

The SIM Toolkit consists of a set of commands into the SIM card.SIM should directly interact with the outside world [11]. SIM card to build up a different application and the end user.

### F. Unstructured Supplementary Service Data

Unstructured Supplementary Service Data is used by mobile phone to communicate with the service provider's [10]. USSD can be used for WAP browsing. USSD messages are 182 alphanumeric characters in length

## III SERVICES CURRENTLY PROVIDER UNDER USSD

The Services Currently Provider under USSD is a Follows:

1. Balances Inquiry
2. Last 5 transaction
3. IMPS P2P funds transfer
4. IMPS P2A funds transfer
5. Generate OTP
6. Generate MMID

Currently the USSD service only available in Mobile Network only [15].

### USSD Flow Process

The process flow for the USSD transaction

1. Customer has to dial USSD code.
2. Request will be sent to NPCI platform.
3. Request received by NPCI'S USSD platform.
4. Customer entered MMID; NPCI USSD platform will identify the bank.
5. Bank will create interactive session.
6. Customer confirm about the status of the transaction.
7. SMS confirmation will be received by customer.

#### (a) Balance Enquiry

For checking balances detail, the customer can press the button "1". Then only customer enters the MPIN. After entered the MPIN, the customer balances detail displayed in the screen [12].

**(b) Mini Statement**

The customer can press the button “2” in the mobile phone. After the customer can enter the MPIN and selected the account for mini statement is required [14].

**(c) IMPS Fund transfer**

The customer can press the button “3” in the mobile phone. Two option are available in IMPS [11]

1. IMPS P2P funds transfer
2. IMPS P2A funds transfer

**(d) MMID Generation**

The customer can press the button “4” in the mobile phone.

**(e) OTP Generation**

The customer can press the button “5” in the mobile phone. IMPS in the websites option will be available [16]. For example: Enter mobile number, Enter MMID Pin, Enter OTP

**Security**

1. Customer ID / Password authentication.
2. Encryption of the information is easily transmitted.
3. Encryption of the information stored in Bank Database.
4. OTP are required by Customer.

**IV PROPOSED SCHEME FOR PROCESSING USSD APPLICATION FOR MOBILE PHONE**

In addition to the facilities provided in the existing system, the proposed system consists of the following facilities

- i. Balance Enquiry
- ii. Mini Statement
- iii. Fund transfer within same bank
- iv. Fund transfer with other banks
- v. Mobile top- up
- vi. Interbank payments
- vii. Loan Review Mechanism (LRM) alert
- viii. Regional language support
- ix. Banking correspondent services
- x. Utility bill payments
- xi. Products and live updates.

Fund transfer like NEFT can be made apart from usual home bank transfers. LRM alert is an useful session based services initiated from the server of the operator for the purpose of alerting the bank customer for the payment of easy monthly installments. BC services is remarkable option provided through USSD for the purpose of cash transaction physically [14]. When a request is made from the customer through USSD, server sends data to the nearby BC’S mobile with the customer’s mobile number so that the BC contact the customer immediately and available at his doorstep for physical cash transaction like fund withdraw or deposit money [16]. Utility bill payment like electricity bill and amount payable for the purpose of agricultural product by the farmer in the rural area are performed through mobile by this application information about the bank product in agriculture and weather updates are available in the proposed USSD service [15].

**A. USSD Code generation**

USSD is the GSM technology. It is used to sending message between GSM phone and hosted server. USSD code are composed of digits #, \* keys, and users to get services from the mobile Operator. USSD code is easy to send message. User can directly uses the USSD code without cost factor [11]. Each group of numbers is started by a \*, and end with a #. For e.g. USSD code as \*99# for the customer to access the services.

**B. Mobile Interface**

The mobile bank can delivered to the consumer through 2 bearer or any environments [10]. A banking system, the related transaction and other history, to require translating banking detail, received consumer’s details, through bank channels such as ATMs.

**C. Database Repository**

The data are stored in bank database. The housing transactional would also use customer care, and financial transactions that use the application.

**D. Transactions**

This module describes two aspects using USSD code as

- i) IVRS- Interactive Voice Response System
- ii) TRS- Transaction Response System

**Decision Tree Algorithm**

The Decision Tree algorithm is the powerful and prediction algorithms. Decision Tree algorithm currently used in data mining. The decision trees represent rules. Rules can easily understand database.

A decision tree is classifier like tree structure, where

- Decision node represents a test on an attribute
- Branch denotes an outcome of the test
- Terminal node denotes a value of the target attribute

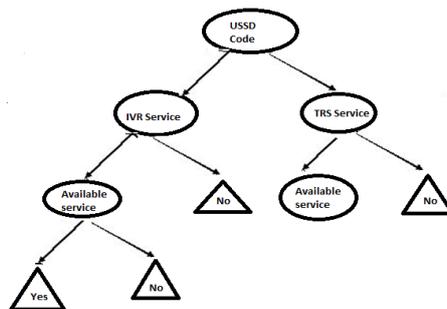
**Attribute Selection**

**Three popular attribute selection measures :**

- a. Information gain b. Gain ratio c. Gini index

**Information gain**

• To select the attribute that is useful for classifying. A quantitative measure attribute is a statistical property. This is known as **information gain** that measures attribute separates the training.



**Tree growing (S<sub>11</sub>, I<sub>1</sub>, O<sub>1</sub>)**

```

Where
S11-Sets
I1-Input
O1-Output
Create a tree T11
IF criteria is finished THEN
Marked the root node in T11 as a leaf node with a most common value of O1 in S11
ELSE
Find a discrete function f (I1) of the input value. According to f (I)'s Outcomes (O11, O21,...On)
IF Splitting>threshold THEN
Label 2 with f (I1)
FOR each Outcomes Oi off (I)
Subtreei=Treegrowing(σf(I)=Oi; S1,I,O)
Connect the node of tT11. To subtreei with an edge
END FOR
ELSE
Marked the node in T11 as a leaf the common value of O1 in S11
END IF
RETURN T11
    
```

**Algorithm: Tree pruning ( $S_{11}$ ,  $T_{11}$ ,  $O_1$ )**

Where:

$S_{11}$ =set

$O_1$ =Output

$T_{11}$ =Tree

Do Select a node  $t_{11}$  in  $T_{11}$ .

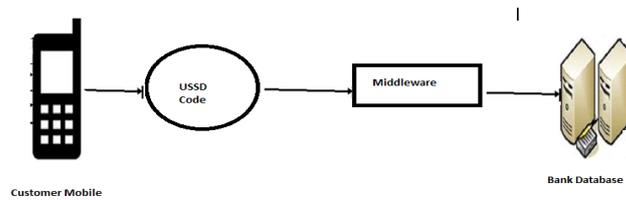
IF  $t_{11} \neq \emptyset$  THEN  $T_{11}$ =pruning ( $T_{11}$ ,  $t_{11}$ )

UNTIL  $t_{11} = \emptyset$

RETURN  $T_{11}$

**V DESIGN AND IMPLEMENTATION**

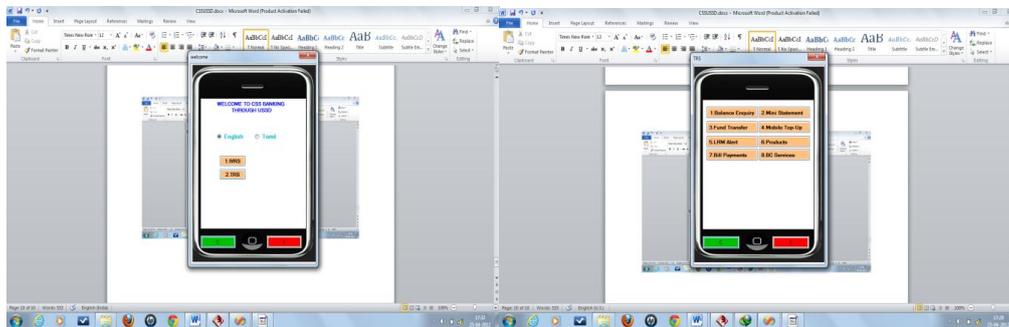
The above diagram gives you an overall idea how the communication happens between the database, Service provider and Mobile Nodes. 1. The mobile node dials a USSD code which is sent to the Service provider. 2. where service provider sends a reply asking the user which language he/she prefers. 3. Customer selects any local language they prefer. 4. Then Service provider asks the customer to send his voice keyword or phrase along with security questions. 5. Customer sends the voice note and answers the security questions. 6. Service provider then compares the received voice note and answers with database data. 7. If both the data are the same then service providers send the MPIN to customer mobile. 8. Customer then proceeds for the transaction by entering the received MPIN.



**Fig 2 BC'S Operational Process Flow**

**VI EXPERIMENTAL RESULTS**

This paper is mainly focused on hill station people because ATM facilities are not available in nearby areas. So people communicate through BC Service. BC stands for banking correspondent. The customers have a choice to get the cash through BC Service in a short span of time a day.



**Fig.1:IVRS and TRS Services**

**Fig 2: Prompted to select a services**

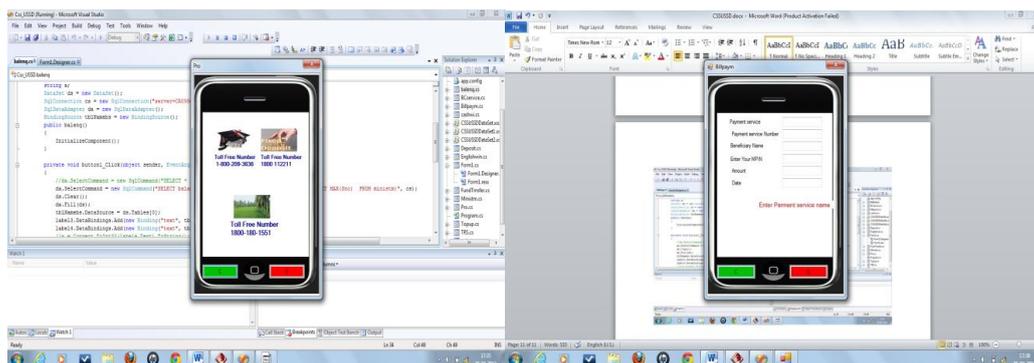


Fig 3: Toll free service

Fig 4: IMPS P2P funds transfer

## VII CONCLUSION

On comparing with existing system, it is toll free with regional languages, additional services and IVRS facilities. The BC person's time for delivering cash is also reduced to 1 day by adding an option in the customer service. The regional language service in IVRS will be very useful to hill station and tribal people who contacts only orally and does not have authorized symbols in their language. Hence by implementing project, hill station people can instantly do their money transfer, bill payment, top up and contact BC person easily. Only mobile phone with GSM network is enough for this application. No internet connection is required. No charges are applicable for the transaction.

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