

## **THE STUDY OF NON-TRADITIONAL SOLUTIONS FOR FINANCIAL INCLUSION**

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### **ABSTRACT**

The new information and communication technologies help developing countries to offer necessary services for the community which could not have these services with the traditional ways. We conducted a research and found that in Albania exist underserved people in terms of access to financial services. As a result an information system is needed for financial services inclusion. We consider different experiences in other countries in similar situation to see what will be the solution to address this issue. Innovative solutions are used in the world to offers financial services in a way that is safe, affordable and convenient for all. These innovative solutions differ from each other in three fundamental ways: technology platform; user interface and wireless communications channel; provider of the solution. After a study we made we found that in Albania the most appropriate solution in terms of technology platform used is the solution that needs a mobile network in the system and a mobile phone for the customer and agent.

Analyzing the data collected using the direct-contact method with the representatives of possible providers and consulting different sources of information we will find the most appropriate solution in terms of the user interface and wireless communications channel.

**Keywords:** information system, innovations, financial inclusion, secure financial services,

### **INTRODUCTION**

Access to financial services is not provided for all in Albania.[1] The use of financial services with the traditional solutions for low income and poor people in Albania is not efficient because it is with high cost. For people leaving in rural areas which has also a lower income and are poorer than people leaving in urban areas the use of financial services with traditional solutions it is also inappropriate due to the long distance from their residences of the financial access points.[1] With the help of non-traditional solutions the necessary financial services could be delivered to the community which could not reach these services with the traditional ones. The non-traditional solution used in the world has an agent in the system that helps the

process of exchanging e-money for cash. The used innovative information systems differ from each other in three fundamental ways: technology platform; provider of the solution; user interface and wireless communications channel. Because providing access to financial services (financial inclusion) it is seeing in the world as a way to reduce poverty and it still exists in Albania, it is needed an innovative information system for financial inclusion in Albania. Implementation of the most appropriate non-traditional solution for financial inclusion it will be difficult because it is a new way of conducting financial services and as a result:

- The users have to want it and use it. In order to achieve this, the system has to be also easy to use and secure.
- The possible providers (which except banks or financial institutions could be telcos or third parties) need to have the right environment to offer the financial services with a non-traditional solution and the users and agents need to feel protected (they have to feel secure that their money will not be lost).

Implementing the most appropriate non-traditional solution for financial inclusion will benefit the most the people leaving in rural areas of Albania because they could not reach financial access points with the traditional solutions, they are poorer and with lower income than people leaving in urban areas. The study of the most appropriate solutions in terms of the technology platform used, the provider of the system and the user interface and wireless communications channel for Albania will serve as a source of information for the policymakers in Albania to draw strategies for the implementation of these innovative information systems and as a result the improvement of financial inclusion and the promotion of financial access in rural areas. In Albania the most appropriate solution in terms of technology platform used is the solution that needs a mobile network in the system.[1] To give the whole picture we need to find the most appropriate solution in terms of the provider of the system and the user interface and wireless communications channel. The study of the user interface and wireless communications channel will be a source of information for the policymakers in Albania to draw a regulation that will protect the agents and customers of the financial services with non-traditional solutions and as a result will promote savings and the access of financial services in rural areas. The study could be a source of information also for the possible providers of the financial services with non-traditional methods to choose the most appropriate solution in terms of user interface and wireless communications channel.

## **MATERIALS AND METHODS**

In order to accomplish the main objective (the most appropriate solution in terms of the user interface and wireless communications channel), the used methodology has been complex combining different information sources and various search methods. Studying world experiences helped on the identification of

non-traditional solutions for financial inclusion used in the world and different ways they are implemented. The previous studies we made have helped to identify the need for financial inclusion in Albania and the most appropriate solution for financial inclusion in terms of technology platform used. The previous conclusion, a mobile network is needed in the solution, is necessary to follow the study of the most appropriate solution in terms of the user interface and wireless communications channel used. The data from different sources of information like white papers, standards and the information gathered with the interviewing method to the mobile operators’ representatives have helped on creating an overview of the world’ existing mobile technologies used in Albania. Knowing the world’ existing mobile technologies used in Albania and having the work experience with the implementation of the mobile network’ value added services we presented the possible user interfaces and wireless communications channels in the non-traditional solutions for financial inclusions that need a mobile network. Using our experience and the information gathered with the interviewing method to the mobile operators’ representatives we identify the benefits and barriers of the implementation of these technologies in Albania. We analyze the possible user interfaces and wireless communications channels and present in the end the most appropriate one.

## **MOBILE NETWORK TECHNOLOGIES IN ALBANIA**

The security on financial services is critically important. The customer and the agent in the most appropriate solution in terms of technology platform used need a mobile phone to communicate with the provider. In this solution a mobile network it is needed in the system. The mobile network technologies that exist in Albania are GSM, GPRS, EDGE and UMTS. Except the agent and the customer, a mobile operator is an actor on the system. The minimum inclusion of the mobile operator in the solution is when the mobile operator offers the user interface and wireless communications channel environments.

Global System for Mobile Communication (GSM) known as one of the second generation 2G systems because both radio signals and speech channels are digital meanwhile in the 1G first generation both of them are analog. The mobile operators in Albania that are using GSM system are AMC, VODAFONE, EAGLE, PLUS. 2G systems are circuit switching systems meaning that they set up a dedicated connection (communication channel or circuit), before the communication between two nodes starts, for exclusive use during the communication session.

General Packet Radio System (GPRS) is packet switched wireless protocol providing no voice value added services that allows information to be sent and received across a mobile telephone network. Packet switching method groups all data that need to be transmitted into blocks or packets and transmit them digitally. GPRS combining with 2G systems is referred as 2.5G. The mobile operator in Albania that are using GPRS technology are AMC, VODAFONE, EAGLE, PLUS.

Enhanced Data Rate for GSM Evolution (EDGE) is known also as Enhanced GPRS because is a version of GPRS with a higher bandwidth. The mobile operators in Albania that are using EDGE technology are AMC, VODAFONE, EAGLE, PLUS.

Universal Mobile Telephone Standard (UMTS) is one of the third generation 3G systems and is the successor of GSM system. The UMTS system could offer advanced application services like video call, internet broadband, etc. Of course the mobile phone has to support these services. There is a combination of GSM and UMTS when the UMTS services are offered. The mobile operator that has a 3G license in Albania is Vodafone and in the near future this license may be offered also to other mobile operators.

The white paper [2] provides more information on 1G, 2G, 2.5G and 3G mobile network technologies.

## **USER INTERFACE AND WIRELESS COMMUNICATIONS CHANNEL**

Everyone has to be included in the financial services offered by the proposed solution. As a result the solution will be also for poor and low income customers and they normally have a basic standard phone. The services needed by the customers could be delivered to them through two application environments client side applications and server side applications. Client side applications are applications that reside on the SIM or mobile device of the customers. We can mention SIM Toolkit and J2ME client-side applications. Only SIM Toolkit application could work in a standard phone. Server side applications are applications that reside on a server away from the customers. We can mention IVR, SMS, USSD and WAP server-side applications. Only IVR, SMS, USSD server-side applications could work in every phone and as a result in a standard phone.

IVR stands for Interactive Voice Response. A call is made to an automatic system and the user get the prerecorded voice instructions how to proceed like press 1 to enter the PIN or press 2 to select the language etc. The user enter information by using DTMF system which is a system that allow the recognition of the key typed on the keypad by using two different frequencies one for the column and one for the row. It works in all phones and uses the voice channels. Standards [3] and [4] provide more information on IVR and DTMF.

SMS stands for Short Messaging System. The customer or the agent initiates the process by sending an SMS to the provider. The application of the provider after process the request, it sends a SMS as a response. The SMSs are stored in the phone of the user or agent and as a result the sensitive information like PIN is exposed to the others.

USSD stands for Unstructured Supplementary Services Data and it is used to transmit and get information to the provider' system via GSM network. It uses messages to communicate in a real time interactive session.

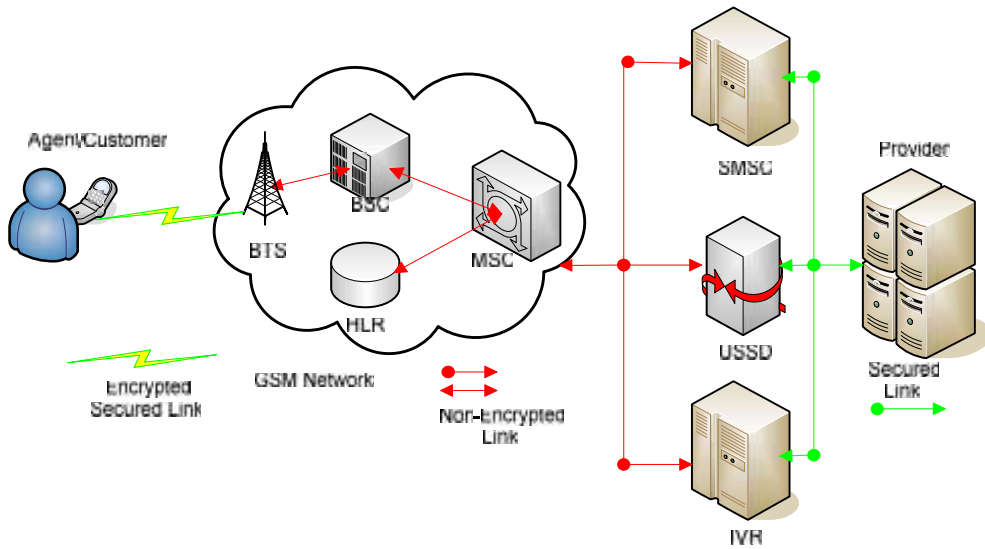


Figure 1: Security on IVR, SMS, USSD communication channels.

A number is called by the user or agent and a menu is appeared in their phone. They could enter data or select options from the menu and send back to the system of the provider. The messages are not stored on the phone. Standards [5] and [6] provide more information on USSD.

It is easy for the customers to use the IVR, SMS, USSD communication channels. They are already familiar with them. There is no additional security, end to end security, when using IVR, SMS, USSD communication channels they rely on the security of GSM system. Figure 1 shows e schema of security when using IVR, SMS, and USSD communication channels. There could be some threats and risks on GSM including GPRS and EDGE networks that expose some vulnerability on the GSM security and as a result when using IVR SMS, USSD as communication channels. The white paper [7] provides more information on risks and threats on GSM networks. We are not considering the UMTS network because its implementation is expensive and is intended for customers that could use advanced applications like video calls that request the support of the user equipment too. We want to propose an information system that offers the financial services for all. People with low incomes or poor people have to be served too and they normally have a standard mobile phone that could support just basic services that are offered with GSM networks.

In order to provide end to end security when using one of the above communication channels in the solution it is needed another application that provide end to end security.

SIM Application Toolkit (SAT) is a set of applications and related procedures which may be used during a GSM session. Standards [8] and [9] provide more information on SAT and its security. SIM Toolkit applications are stored in the SIM

which is a SmartCard that stores data for GSM network customers so could be used for applications that require high security such as financial services applications. The customer or the agent could access a menu which is created with SAT and is stored on the SIM. They could initiate commands to the provider like transfer money to a specified account or their handset like display menu etc with the confidence that is a secure communication channel. All the mobile phones actually available in the market support SIM Toolkit. The communication security when using SAT Application Toolkit it is shown in figure 2. Hardware Security Module (HSM) offers cryptographic operations [10]. As a result when a HSM is implemented on the server of the solution the SIM which is a smart card and as a result offers cryptographic operations could communicate in a secure way with the HSM.

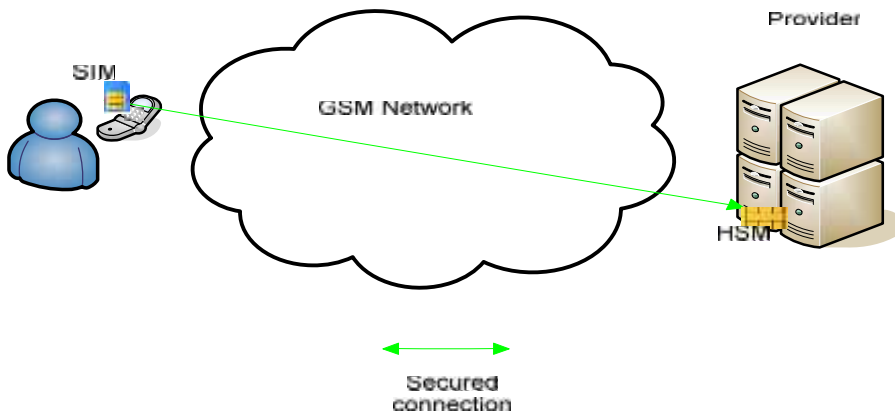


Figure 2: Security on SIM Application Toolkit communication.

It is not easy to deliver SAT on SIM after the customer has the SIM card. When a new or an updated SAT is needed, the SIM card could be replaced with a new SIM card having the new or the updated SIM toolkit application or through Over The Air (OTA) technology these updates are delivered to the SIM cards that have optional features. The SIM card that has the optional features could be provided by all the big SIM suppliers. The SIM suppliers for Albanian Mobile Operators like G&D, GEMALTO, SAGEM, INKRIPT offer these optional features. Two of the ways that could be used to deliver SAT applications on the SIM through OTA technology are having a WIB enabled SIM or S@T enabled SIM.

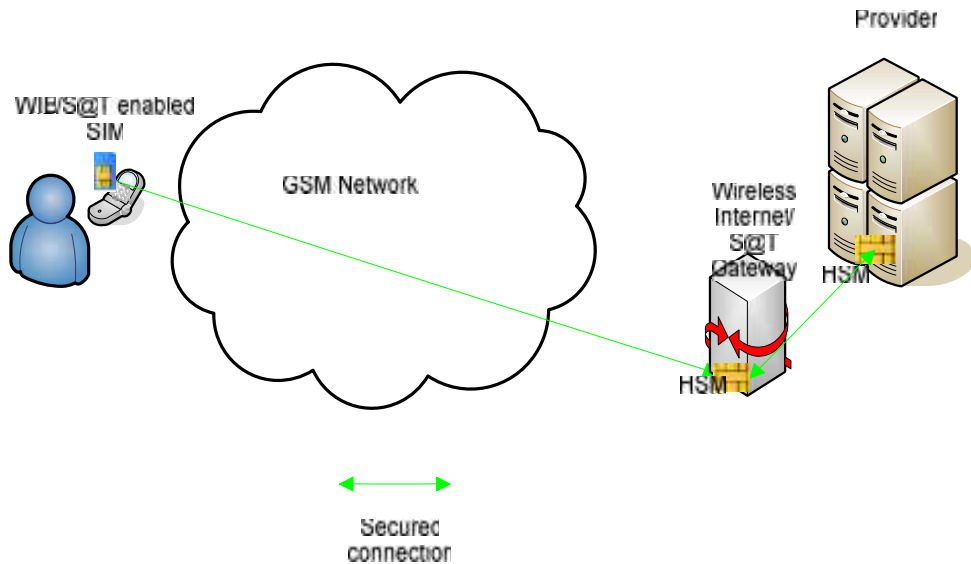


Figure 3: Communication security of SAT on WIB/S@T enabled SIM.

A schema of security when using SAT on WIB/S@T enabled SIM it is shown in figure 3. WIB (Wireless Internet Browser) works together with Wireless Internet Gateway (WIG). S@T (SIM Alliance Toolbox) works together with S@T Gateway. Hardware Security Module (HSM) has to be implemented also in Wireless Internet/S@T Gateway in order to have a secure communication.

The providers of the non-traditional solution will need to cooperate with the mobile operator to develop or deploy the SAT on the SIM or the provider will be the mobile operator itself.

## CONCLUSIONS AND FUTURE WORK

With the help of non-traditional solutions the necessary financial services could be delivered to the community which could not reach these services with the traditional ones. We know from previous researches that exists people in Albania that does not have access to financial services with the traditional solutions. Because providing access to financial services (financial inclusion) it is seeing in the world as a way to reduce poverty, and poverty still exist in Albania, we need a non-traditional solution for financial inclusion. The non-traditional solutions used in the world differ from each other in three fundamental ways: technology platform; provider of the solution; user interface and wireless communications channel. We had study the most appropriate solution in terms of technology platform used and found that the most appropriate one is the solution that needs a mobile network in the system. Providing access to financial services for all (also for poor and low income people) means the customer has a standard phone. The possible solutions in

terms of the user interface and wireless communications channel in a system that needs a mobile network and provide financial inclusion to all are using as a communication channel an IVR, USSD, SMS or SIM Application Toolkit. The security is really important in the use of financial services. The most appropriate solution is the one that provide the best security. SIM Application Toolkit provides end to end security and as a result is the most appropriate solution in terms of user interface and wireless communications channel. We will find in the future the most appropriate solution in terms of provider of the system.

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