Kerberos Based Emergency Services System

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ABSTRACT

The Emergency services numbers are widely used in different countries, It is a three-digit number, which is used for different emergency services like ambulance, police and fire. Some countries are having a single emergency number for all emergency services and there are also some other countries which are having different emergency numbers for different emergency services. The popularity of these emergency numbers are increasing day by day, due to this popularity, fake emergency calls or prank calls or hang-up calls are also increasing and such type of calls are not only a wastage of time but also wasting lots of emergency resources and because of false calling many times the needed people are not able to get the emergency services and in many countries these fake calls are very common because there is no provision of giving punishment on fake calling.

In this paper we have proposed a model 'KB-ESERV' which provides a proper authentication of a person before registering for a SIM card and it provides an inbuilt application of emergency services with the other applications of mobile. This model will not only stop the fake calling but also the forgery of SIM cards.

Keywords - Authentication Server (AS), Kerberos, Kerberos Based Emergency Services System (KBESERV), Subscriber Identity Module (SIM Card).

I.   INTRODUCTION

For an emergency service, user simply dial the emergency number and wait for the operator to answer "number, please?" then the user will tell his/her required service[1].

These kind of Emergency services are highly used in many countries. Many countries are having a single three-digit number of all the emergency services like USA, UK, Australia etc. and there are also some other countries like India, Iran, Egypt etc. having different numbers for different emergency services[1] and because of the popularity of emergency services the fake calls are also increasing day by day and these fake calls are not only wasting the time but also wasting the emergency resources because in many countries there is no provision of punishment and also having a lack of proper authentication during buying of SIM card. There are lots of people who are buying unlimited SIM cards through false identification because there is no provision of limit in SIM cards buying and also a lack of proper verification of documents of different ID's.

In this paper, we have proposed a model KBESERV which uses concept of Kerberos. In this model there is no provision of submitting documents during buying of SIM card. User will only buy the SIM card and he/she will insert the SIM card into his/her mobile and then the authentication will begin. After verification, his/her SIM card will work. This model has also a provision of issuing 2 to 3 limited number of SIM cards. User can use the emergency services through inbuilt application, known as emergency services. In this application user will get all the emergency services and user can either use the automatic voice call or manual voice call for the corresponding emergency service.

For the fake calling there will also be a provision of punishment by the Government of respective country.

II.   RECENT INCIDENTS

In 2009, there was a news that A serial crank caller who was using a donated cell phone has plagued 911 with approximately 2,000 fake Emergency calls during the period of six months and sending firefighters and police on wild goose chases[2].

In India which is No. 1 in road accident death according to report of WHO on 'Decade of Action for Road Safety 2011-2010'[3]. The fake calls are very common.

In July 2013 in India, a man called the 108 toll free number for emergency ambulance service. The ambulance covered 47 km and didn't find any emergency there. In several cases it is also observed that people living in remote areas using the ambulance service as a mode of transportation[4].

In Belgium it was found that nearly one out of every three phone calls made to the emergency services were fake calls or unnecessary calls. The fake calls are also increasing delay in the processing of real emergency calls. In 2011,The alarm centers received nearly 2,560,000 calls for ambulance, police, fire and out of them only 815,000 or 31% of those calls were not real emergencies[5].

According to the news of April 29,2013, In city of Hyderabad, India, it was found that of the 50,000 calls which were made to the 'Dial 100 system' (which is built mainly for those citizens who

are looking for police assistance during emergencies) about 20,000 calls were fake[6].

In may 2013 in Mumbai, India, The dharavi police arrested a 35 year old man who was selling SIM cards on the basis of forged documents[7].

There are so many rising instances related to SIM card frauds where prepaid cards are issued without verifying the documents of user[8].

These kind of Forgeries of SIM cards are also increasing the incidents of fake calling and this is happening only because of the lack of proper SIM Card authentication. Sometimes Unintentional calls are also occurred when a person or phone recklessly dials the emergency number. This includes phantom wireless calls, hang-up calls and misdials. Phantom wireless calls are a documented problem in the countries like United States, the United Kingdom, Australia and Canada although other countries where wireless phones are used largely also experience this kind of problem. Such Calls occur because of automating dialing, where a cell phone user recklessly dial the 9 or 1 key on a phone, which is preprogrammed to dial 911. The phone automatically dials the number 911,even without pressing the "send" by user. This often happens when a wireless phone is attached to a belt or in a pocket and the 9 or 1 is pressed[9].

Such kind of activities are mainly happening due to lack of proper authentication during buying of SIM cards, Unlimited buying of SIM cards by an individual person, Lack of proper punishment during fake calling and preprogramming of wireless phones for emergency services. In many countries like India where there is a provision of different numbers for different emergency services is also a big issue.

III.   REQUIREMENTS FOR THE SAFE EMERGENCY SERVICES SYSTEM

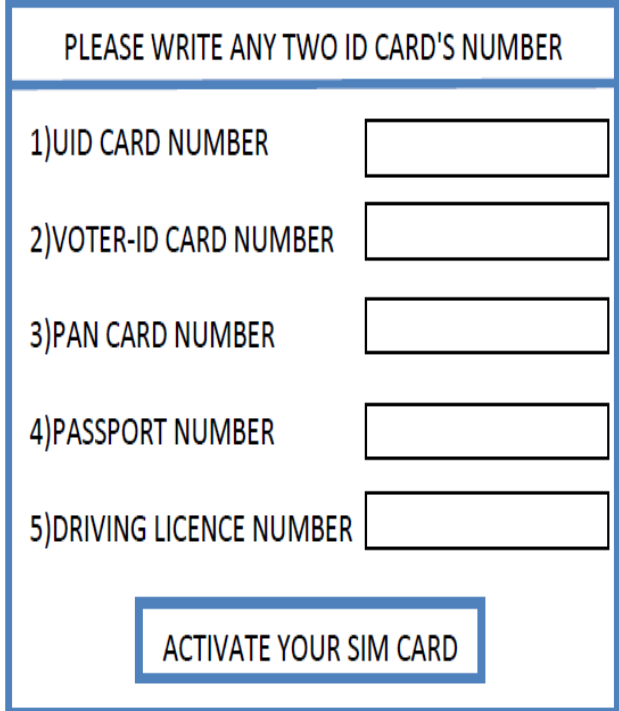There are following requirements to stop the above type of incidents.

1) Proper verification of user's documents, who is requesting for SIM Card services. So that forgery of documents can be stopped.
2) Limited issue of SIM Cards for a particular user.
3) Saving of papers which are used during Document verification of user, who is applying for SIM Card.
4) Single number for all the emergency services.
5) Automatic dialing of emergency numbers should be stopped.
6) Provision of punishment on fake calling.

IV.   THE PROPOSED EMERGENCY SERVICES SYSTEM

We have proposed Emergency services system named KBESERV. This system contains two stages: Registration and Accessing emergency services. These two stages are described in later section. We explained these two stages one by one.

A. Registration stage

In this phase user will buy a SIM card from any SIM Card distributer and insert the SIM into his/her mobile. After inserting the SIM, a dialog box will open. From this dialog box user has to write his/her two id card's number among five given id cards like UID card, Voter-ID card, PAN card, Passport & driving license etc. after writing the numbers user has to select the option 'Activate your SIM Card'.
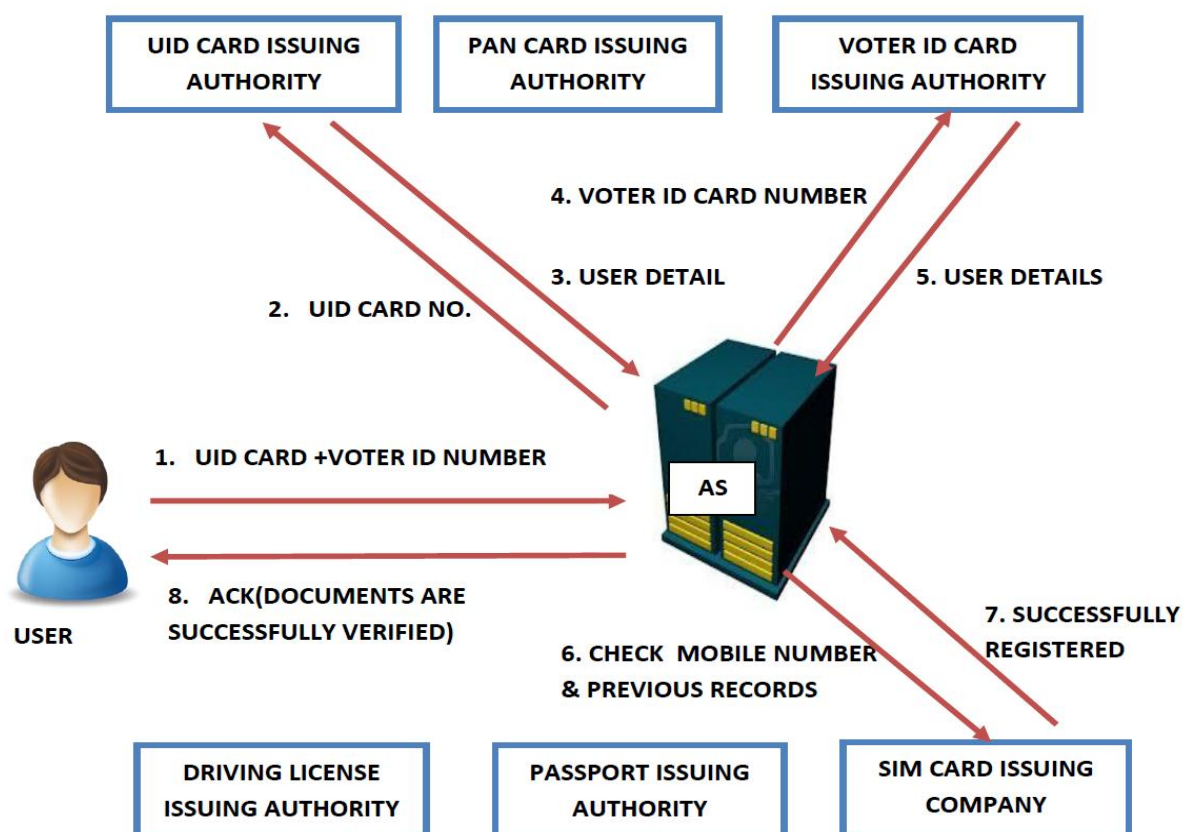

Fig. 1: Registration Stage

Fig. 2: Authentication Process

For example user has filled UID Card and Voter-Id Card number, these details with the corresponding user's mobile number will be sent to the authentication server (AS).

Now AS will send the UID card number to UID Card issuing authority. UID card issuing authority will send details like user's name, address, father's name, date of birth etc. to 'AS'. After getting these details AS will send the user's voter-id card number to voter-id card issuing authority. Voter-id card issuing authority will also send details like user's name, address, father's name, date of birth etc. to 'AS'. Now after getting these details from both the sources AS will verify and check the common details. After successful verification AS will send the user's mobile number and the above verified details to SIM Card issuing authority. The SIM Card issuing authority will check the following two details-
1) How many number of SIM Cards have been registered in the name of user or not.
2) Whether he/she is exceeding the maximum number of SIM issuing limit or not (which will be normally 2 to 3).

After these successful validations, user will be successfully registered for using SIM services of the corresponding SIM Card issuing authority. These steps of verification not only give a proper way of verification of user's documents but also save the papers which are normally used in document verification. This will also stop the forgeries of documents.

After successful registration, user will get the Acknowledgement (ACK) of "Documents are successfully verified" and the SIM card issuing authority will also provide the feature of using emergency services in the option of company services which will be available in user's application list.

There may be a case when User wants to use more than 2-3 SIM cards. In that case User can go for another option of 'Cancel My SIM card' which will be provided by the SIM card issuing authority. Under this category user will get 2 options-
1) Cancel my SIM card permanently.
2) Cancel my SIM card for 2 months.
In second option after 2 months, User's SIM card will be permanently closed.
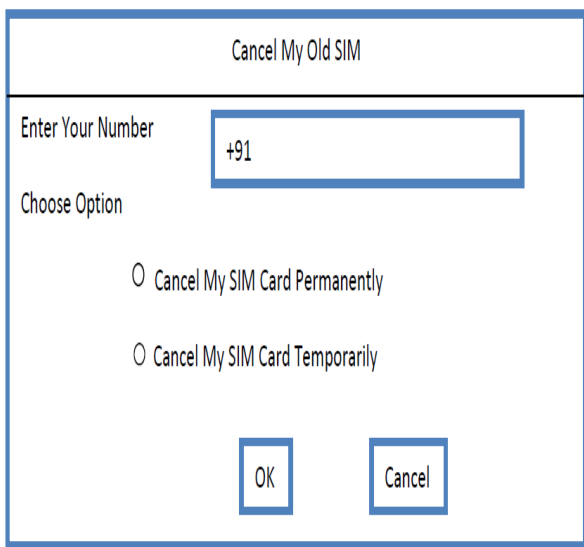
Fig. 3: Cancel My SIM Card

B. Accessing emergency services stage

The SIM card issuing authority will provide a service under the category of Services, known as 'Emergency services'. User has to go to the company services options which can normally be seen in applications category of mobile. User has to select the option of Emergency Services and he/she can select the type of service depend on his/her requirement like- Ambulance/doctor service, Police service, Fire safety service etc. Other options can also be added by SIM card issuing authority depend on customer's feedbacks. after selecting the option user can either go for call manually or call automatically, which are two voice call options.

The selected type of option will be transferred to the nearest emergency service center through mobile network. Now the emergency service center will check the user's geographic location and will give the instructions to the user's nearest emergency services to provide the emergency service which is requested by the user and then the corresponding service will follow the shortest path to reach to the user's area.

The option of emergency service will also save the user from automatic dialing of emergency numbers because for using emergency services user has to go to the internal option of application services and in the case of fake calls government should have a provision of giving one warning and then the suitable punishment to the fake callers so that they will have a fear of fake calling to the emergency services.
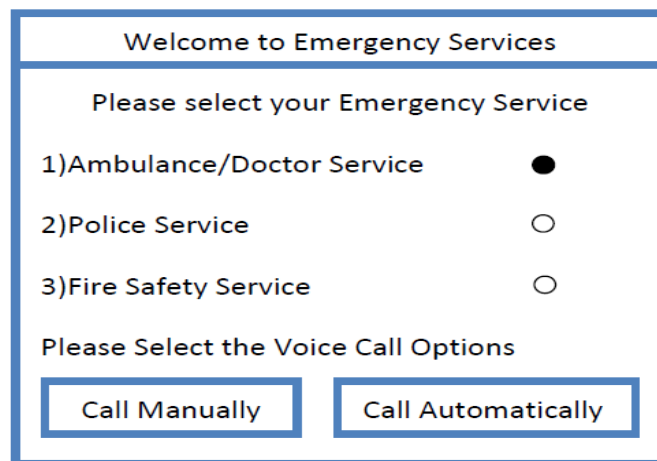
Fig. 4: Accessing emergency services stage
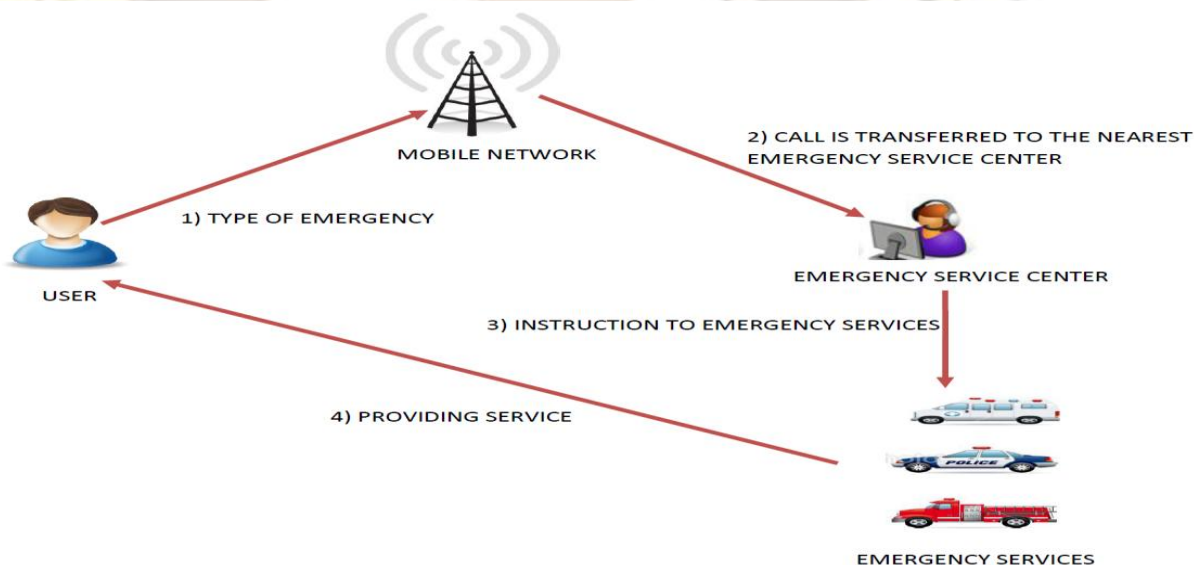
Fig. 5: Transferring Request to the Emergency Service Center

V. THE PROPOSED EMERGENCY SERVICES ALGORITHM

The steps of KBESERV model are given below:

A. Registration Stage

REGISTRATION_STAGE (ID_n, ID_{ni}, ID_{nj}, SI_n)

1) If ($ID_n == 2$)
2) // ID_n will count number of IDs entered by user
3) {
4) AUTHENTICATION_PROCESS( )
5)   {
6)   If(ID_{ni} (details) = = ID_{nj} (details))
7)   For i, j =1,2,3,4,5 and i != j   // Match the common   details of Both ID_{ni} and ID_{nj}, Where ID_{ni} (details) and ID_{nj} (details) contain details such as User's Date Of Birth, Name, Address, Father's Detail etc.
8)   {
9)   If ($SI_n < 3$) // Where, SI_n = No. of SIM issued and   n =0,1,2,3
10)   {
11)   ACTIVATE_MY_SIM( );
12)   }
13)   else
14)   {
15)   CANCEL_MY_OLD_SIM( );
16)   }
17)   else
18)   {
19)   Message ("IDs are not matched");
20)   }
21) else
22)   {
23)   Message ("Enter minimum two IDs")
24)   }

ACTIVATE_MY_SIM( )
1)   {
2)   Message ("Your SIM card is Activated successfully")
3)   }

CANCEL_MY_OLD_SIM( )
1)   {
2)   Enter your old number.
3)   Choose the option.
4)   Press OK.
5)   exit( );
6)   }

B. Accessing Emergency Services Stage

Accessing_Emergency_Services( )
1)   {
2)   Select the required emergency service.
3)   Call manually or call automatically( )
4)   {
5)   User U_i send the request R_i to emergency service center through mobile network.

6)   For U_i = 1,2,3,.... and R_i = 1,2,3,.....
7)   Emergency service center check the requested service and identify U_i's Geographic location.
8)   Emergency service center will instruct the U_i's nearest emergency service and provide service.
9)   }
10)   }

VI. CONCLUSION

In this paper we have proposed a KBESERV model which is better known as Kerberos based emergency services system which provides a proper authentication of user's documents and it not only save papers but also restrict the forgeries of documents, forgeries of SIM cards during the distribution of SIM and this will also stop the fake calls from the unauthenticated users. Apart from these it provides an efficient and easy way of using all the emergency services and the user will get all the emergency services in one option of mobile applications. Automatic dialing of emergency numbers can be restricted easily through this model.

VII. ACKNOWLEDGEMENTS

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