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Implementation of Trouble Intimation System in GSM & GPS Based Mobiles

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Abstract: Communication is an exchanging of information by speaking, writing, or by using some other medium. If information exchange is carried out with the help of mobile devices that Communication is called Mobile Communication. Communication in mobile networks is possible whenever the signal is receiving by the mobile. If the signal is not receiving by the mobile and the user is in some trouble, intimation about that trouble to any other is not possible. So, intimation about that trouble is possible by sending SMS (Short message service) in GSM (Global system for Mobile communication) based and GPS (Global Positioning System) based mobiles even if the mobile is not receiving network signal with the help of location based services. In this paper we explain how to reach the user when his/her mobile is not in coverage area.

Keywords: GSM (Global system for Mobile communication), GPS (Global Positioning System), SMS (Short message service), Mobile, Trouble Intimation System.

I. INTRODUCTION

Initially Mobile Communication is started between a pair of users on a single channel. The usage of mobile devices is increasing rapidly. So, the allocation of available frequency spectrum to all mobile users will become a problem. To solve this, Cellular communications came into existence. Cellular communication uses a basic unit called cell. Each cell consists of some Hexagonal area with a base station located at the center of the cell which communicates with the user. [3]. A Mobile station or subscriber unit communicates to a fixed Base Station (BS) which in turn communicates to the desired user at the other end [1].

The Mobile Station (MS) consists of the physical equipment used by a Public Land Mobile Network (PLMN) subscriber to connect to the network. Mobile Station (MS) comprises the Mobile Equipment (ME) and the Subscriber Identity Module (SIM).

The Base Station (BS) consists of Base Station Controller (BSC) and one or more Base Transceiver Stations (BTS). Base Station Controller (BSC) provides various facilities like allocates a channel during call, maintaining the call by providing quality, controls the power transmitted by the Base Transceiver Stations (BTS) or Mobile Station (MS) and generates a handover to another cell when required.

Base Transceiver Stations (BTS) is used to provide radio access to the Mobile Stations (MS). Base Transceiver Stations (BTS) consists of Radio Transmitter or Receiver (TRX), signal processing and control equipment, antennas and feeder cables.

The Base Stations (BS) is in turn connected to the Mobile Switching Center (MSC), and it connects to Public Switched Telephone Network (PSTN).

Mobile Switching Center (MSC) provides various facilities such as switching calls, controlling calls, logging calls, interface with Integrated Service Digital Network(ISDN), Public Switched Telephone Network (PSTN), Packet switched Public Data Network (PSPDN), mobility management over the radio network & other networks, radio resource management, handover between Base Station Controllers (BSC) and billing information.[2]

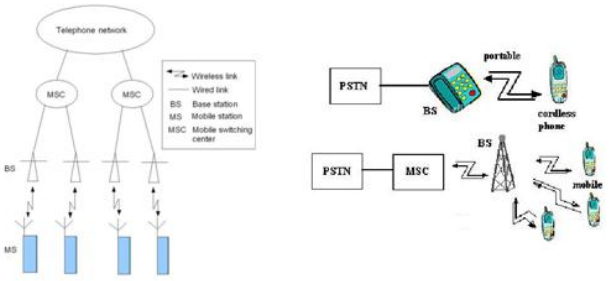

Fig.1: Basic mobile communication structure

II. RELATED WORK

In [2] authors said the range of mobility was defined by the transmitter power, type of antenna used and the frequency of operation. The present day cellular communication uses a basic unit called cell. Each cell consists of small hexagonal area. A base station located at the center of the cell it communicates with the user. According to them if the user is within the cell range then only user receives signal from base station. In [3] As the phone user moves from one cell area to another, the system automatically commands the mobile phone and a cell site with a stronger signal, to switch on to a new frequency in order to keep the link. In [6] GPS and Network Location Provider are used to knowing where the user is. This allows our application to be smarter and deliver better information to the user. In [8] to send SMS

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to the user relatives and to the nearest police station SMS manager API and Built-in SMS applications are needed.

III. PROPOSED STRATAGY

In this paper we proposed a methodology called Trouble Intimation System, this helps to send a message alert to your dearest ones and to the nearest police station when you are in a trouble and where your mobile is not having the network signal.

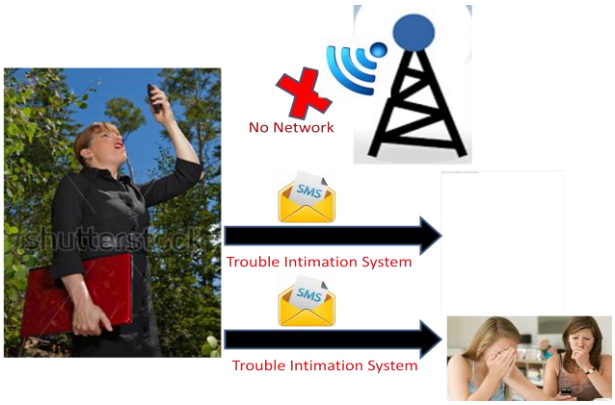

Fig: 2. Trouble Intimation system

Trouble Intimation System is implemented in three phases.

A. Finding the location of user.
B. Comparison of location access time with threshold time
C. Sending SMS (Short Message Service) alert

A. Finding The Location Of User

The user's current location can be finding in two ways.

a. Location based on network.
b. Location based on GPS (Global Positioning system).

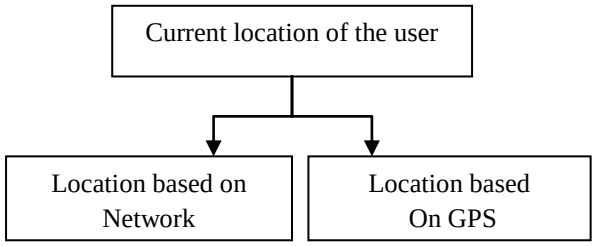

Fig: 3. Finding Location of user

a. Location based on Network:

The network location provider determines the user location based on cell-tower and Wi-Fi signals. The network provides the approximate location of the user.

b. Location based on GPS:

GPS (Global Positioning System) gives most accurate location but it takes more time to return the location than a network.

To get the location of a device getLastLocation() method is used.

Public abstract Location getLastLocation (GoogleApiClient client);

- This function returns the most recent location currently available.
- If location is not available, it returns NULL, and it happens rarely.
- The best location accuracy available while respecting location permissions will be returned.

There are two location permissions.

i. ACCESS_COARSE_LOCATION

a. Public static final string ACCESS_COARSE_LOCATION
b. It provides an approximate location of the device.

ii. ACCESS_FINE_LOCATION

a. Public static final string ACCESS_ FINE_LOCATION
b. It provides the exact location of the device

- Algorithm to get the current location:

```
Location getlocation()
{
//Accessing of location service
getSystemService(LOCATION_SERVICE);
//Getting status of GPS
GPSstat=
locationManager.isProviderEnabled(LocationManager.GPS_PROVIDER);
//Getting status of Network
Networkstat=
locationManager.isProviderEnabled(LocationManager.NETWORK_PROVIDER);
if(!GPSstat&&!Networkstat){//No network provider is enabled}
else
{
canGetLocation=true;
if(Networkstat)
{
locationManager.requestLocationUpdates(LocationManager.NETWORK_PROVIDER,
MIN_TIME_UPDATES,MIN_DISTANCE_CHANGE_FOR_UPDATES);
if(locationManager!=NULL)
{
locatn=locationManager.getLastKnownLocation(LocationManager.NETWORK_PROVIDER);
 if (locatn != null) {
 lat = location.getLatitude();
 longit = location.getLongitude();
 }}}
//Getting the location with GPS
if(GPSstat)
{if(locatn==NULL)
{
locationManager.requestLocationUpdates(LocationManager.GPS_PROVIDER,MIN_TIME_UPDATES,
MIN_DISTANCE_CHANGE_FOR_UPDATES);
if (locationManager != null){
locatn =
locationManager.getLastKnownLocation(LocationManager.GPS_PROVIDER);
if (locatn != null) {
lat = location.getLatitude();
longit = location.getLongitude();
}}}} return locatn;}
```


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Location updates are requested based on Minimum time and Minimum Distance criteria.

- Minimum Time: It is an elapsed time between location updates.
- Minimum Distance: Location Provider will send updates to the application for every specified distance. Its value is greater than 0 always.

Both minimum time and minimum distance are also used at the same time to get the locations updates. In this paper we are using minimum time criteria to get the location updates and for every 5 minutes. For that initialize mintime variable to 5 minutes.

```
mintime=5*1000*60; //equal to 5minues
```

- Algorithm to get location updates for every 5 minutes

```
getlocation_mintime()
{
locationManager=(LocationManager).getSystemService(Context.LOCATION_SERVICE);
LocationListener = new LocationListener()
{
 void onStatusChanged(String provider,int status,Bundle extra)
   { }

void onProviderEnabled(String provider)
      {
       Toast.makeText(MainActivity.this,

"Providerenabled"+provider,Toast.LENGTH_SHORT.show();
      }

void onProviderDisabled(String provider)
      {
Toast.makeText(MainActivity.this,"Providerdisabled:"+provider,Toast.LENGTH_SHORT.show();
      }
void onLocationChanged(Location locatn)
      {
      WorkWithNewLocation(locatn);
      }
  };
   long mintime =5*1000*60;
locationManager.requestLocationUpdates(getProviderName(),minTime,locationListener);
}
```

B. Comparison Of Location Accessing Time With Threshold Time

As said earlier, the current location of the user is getting with the help of getLastLocation() function based on network and GPS(Global Positioning System).The location updates are requested for every 5 minutes based on minimum time criteria.

getLastLocation() function returns two values whenever it is requested for updates. If the location is found by either of the network or GPS (Global Positioning System) then it returns the location coordinates otherwise it returnsNULL.

In this paper we proposed to send an intimation message to the dearest ones of the user as well as to the nearest police station if trouble intimation system is not finding the location.

Sending intimation messages to the dearest ones & police station will lead to another problem if the location is not located within the 5 minutes. So, that's why some time should be assigned as threshold time, with in that time getLastLocation() function calls for updates. If location found within the threshold then no message alert will send .Otherwise an intimation message will be sent.

In this paper, we are setting the threshold time for 60 minutes. The comparison of location updates with threshold time is based on the NULL values returned by the getLastLocation() function. The getLastLocation() function tries to get the updates for every 5 minutes. For 60 minutes the number of NULL's should be 12.So, count variable is required to count the number of NULL's. Whenever count reaches to 12 then automatically SMS alert system would be initiated.

- Algorithm for comparison of location updates with threshold time

```
Cmp_with_threshold()
{ Count=0;
  // for network based location updates
locatn=locationManager.getLastKnownLocation(LocationManager.NETWORK_PROVIDER);
if(locatn==NULL)
count=count+1;
else
{ lat = location.getLatitude();
longit = location.getLongitude();}
if(count==12)//for 60 minutes of threshold time
{send_SMS();//SMS alert would be initiated with location coordinates}
// for GPS based location updates
locatn = locationManager.getLastKnownLocation(LocationManager.GPS_PROVIDER);
if(locatn==NULL)
count=count+1;
else
{ lat = location.getLatitude();
longit = location.getLongitude();}
if(count==12)
{send_SMS();//SMS alert would be initiated with location coordinates }}
```

C. Sending SMS (Short message Service) alert

SMS (Short Message Service) alert will be sent in two ways.

i. Using SMS Manager API
ii. Using Built-in SMS application

i. Using SMS Manager API

This performs the operations such as sending text, data and pdu SMS messages by calling SmsManager.getDefault() method.

```
SmsManager Smsmgr= SmsManager.getDefault();
Smsmgr.sendTextMessage("destination_mobile_number" ,"source_mobile_number", "sms_message", null,null);
```

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ii. Using Built-in SMS application

This is another way to send SMS, but it uses device's built-in SMS application to send SMS message. ACTION_VIEW action is used to launch SMS client installed.

Intent Smsintnt=new Intent(intent.ACTION_VIEW);

Phone number,Message is specified in Built-in intent as follows

Smsintnt.putExtra("address", new string("1234567891;100"));

Smsintnt.putExtra("sms_body","TROUBLE INTIMATION SYSTEM");

SMS Manager API and Built-in SMS need SEND_SMS permission.

IV. CONCLUSION

Communication is very important in a real life. We have so many communication channels. We are able to identify the user when he has a signal in his/her mobile. If the user is getting obstacles, after some time, we are able to catch the user. In this paper we proposed a new methodology which will able to identify the user when he is not in a coverage area and we are sending information to user relative and nearby police station in terms of a message. This Trouble Intimation System will waits for a signal up to some threshold time. This intimation is possible based on GPS (Global Positioning System) based and GSM (Global system for Mobile communication) based location finding technology.

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BIOGRAPHIES

K. Navatha has completed her M.Tech from JNTU, Hyderabad and she has 4.5 years experience in teaching. She is presently working in a CSE Dept as an Assistant Professor in St Martin's Engineering College, Hyderabad. Her area of interest is Software Engineering, Network Security, and Mobile Computing.

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K. Meghana completed her B.Tech from JNTU Kakinada in the year of 2014. Now she is doing her M.Tech in VIT, Visakhapatnam in CSE department. She published 3 papers in international journal. Her interested areas are Network security, Data management systems, Automata and Compiler design.