

Trajectory of End User Geographical Location Using LBS Systems

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Abstract— In today's fast moving life, a service based on location has very much significance in everyone's life. As the trend of smart phones, mobiles, iPhones, and all the gadgets emerging today and it's very important for the mobile user to have the location based services. Location based service can be elaborated as the services which uses the users geographical location which consist of X and Y coordinates, which is generated by GPS it acts as positioning device. This project describes about how to identify the geographical location and the coordinates of the mobiles phones in short time period(in terms of seconds) using location querying application, short codes and LBS. Short code is nothing but is a GSM service which enables high speed interaction between mobile customers and services. LBS, which uses the GPS as location provider through geographic location for mobile network.

Here we are using short code to communicate with the LBS system to fetch the required current location of the mobile gadgets through MSC, HLR, BSC and BTS. The implementations of the system that helps the user to fetches information from the server and sends the information via SMS to the mobile. Frontend application coding is done in PHP, VB script and database used to update the location information and track the location.

Index Terms— Location Based Service (LBS), Global Positioning System (GPS), PHP.

I. INTRODUCTION

A mobile network operator or MNO, also known as a wireless service provider is a provider of services in wireless communications that owns or controls all the essential materials to vend and deliver services to an end user including radio spectrum allocation, wireless network infrastructure, advertising, customer care, provisioning computer systems and marketing and repair organizations.

Mobile phone is the most broadly used compact device. Every mobile phone user can conveniently communicate with each other through SMS at very low price. The SIM

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(Subscriber Identity Module) is an integrated chip that is intended to securely store the IMSI number and its related key, which are used to identify and authenticate subscribers on mobile telephony devices.

Location-Based Services (LBS) is expanding rapidly with the capability of mobile networks to determine locations of handy devices accurately. LBS purposes provide location, navigation, information, targeted advertising, proclamation and other services, where the alertness of the user is decisive. These applications are generally developed over positioning systems and the setup is increased to support various task-specific location-dependent responses.

The Global Positioning System (GPS) is a space-based steering system that provides location and time information in all climatological conditions, anywhere or near the globe where there is an unobstructed line of sight to four or more GPS satellites. The system gives critical possibilities to military, civil, and commercial users around the world.

A Short Message Service Center (SMSC) is a section of a wireless network that handles SMS operations, such as routing, forwarding and packing incoming messages on their way to desired endpoints. Wireless network operators connect SMSCs through SMS gateways.

HLR is a permanent database about mobile subscribers in a large service zone (generally one per GSM network operator). HLR database contains IMSI, MSISDN, Prepaid/Postpaid, Roaming restriction, MSC/VLR, supplementary services.

VLR is a temporary database which revises whenever new MS enters its area, by HLR database. The VLR control those mobiles roaming in its area. VLR reduces number of queries to HLR. VLR database contains IMSI, TMSI, MSISDN, MSRN, Location area, Authentication key, etc.

Organization of the paper is as follows. Section II gives the work related to this paper. Section III describes the proposed system. Section IV provides simulation results and performance analysis to explain the goodness of the proposed system. It also discusses the latency and benefits of an automated system. Conclusion is presented in section V.

II. RELATED WORK

The proposed system reduces the pitfall in the previous systems by the way of automating the overall process. Therefore this will provide improved efficiency because there will be no user intervention. Also this reduces the propagation delay by the way of improving the throughput. Reduced implementation cost, Reliability, Robustness and Computerization are some of the adequate qualities of this system.

Mahesh kadibagil developed a system which includes a mobile client, a repository, and a web client and map service. The mobile client is used to find position and send a popup SMS to subscriber when his/her friends or family members available near the user's area of direction [6]. Sourabh Pawade describes TOA (Time of Arrival) method which calculates the distance of a mobile telephone and a BS based on the TOA of a signal sent from the mobile telephone at the BS [14]. Chao-Lin Chen describes a system which uses two-step least square method for calculating the 3D details (i.e. the longitude, latitude, altitude) of the mobile devices. A fusion algorithm is used to obtain the final location estimation from both the network-based and the satellite-based systems [13].

Aloul.F, et al., proposes a system which uses information which is provided in a typical mobile such as its IMEI and IMSI No. and the various Wi-Fi access points on campuses to identify the user's position. . A mobile application program, that communicates with a web server and a GSM modem to give users with real time data based on a person's movements and location [16]. Various PHP and MYSQL codings are taken to make communication between SMSC server and SMPP and to fetch required data from the database [17].

III. PROPOSED SYSTEM

The Automated mobile tracking system using short codes improves the efficiency by reducing the latency of getting the required output. Because of automation, better quality or increased certainty of quality, improved robustness (consistency), of processes or product are achieved.

A. Process Flow Chart

Fig. 1 shows an overview of the process. Initially the mobile number which is need to be locate is send via SMS from mobile station using Short Code. Then the message containing 10 digit number will reaches MSC and the MSC will send the message to SMSC. From the SMSC the information will give to LBS server for getting the information of the 10 digit number, LBS server will make a query to HLR to get the VLR ID. After getting the VLR ID, LBS server will send the 10 digit number to MSC/VLR to fetch the BTS id or cell id, latitude, longitude details. This information will reaches LBS server from MSC and the BTS address will be taken from database using BTS id. Once the required information collected by LBS server then it will forward those information to SMSC Gateway to deliver the geographical status of the given 10 digit number to the sender of the mobile station.

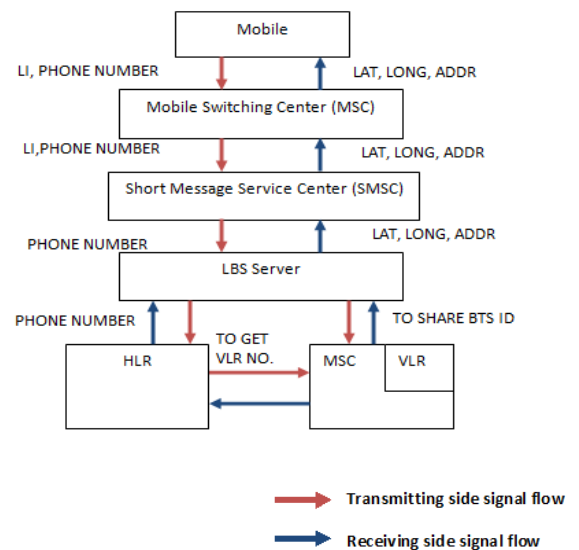


Fig. 1. Flow for overall process

B. SMSC Server

SMSC is a network portion in mobile network which is susceptible for transfer of text messages from source to destination. When the subscriber sends text message to another user, initially, the SMS is stored in SMSC and then transfers to destination user when they are accessible. If the destination user is not available, it will store the message in a stack and update the user condition for every 5 minutes. If user is available, it will forward the SMS else it will discard the SMS once the validity period is end. In SMSC, the message transfer from source to destination is done by a protocol named as SMPP (Short Message Peer to Peer).

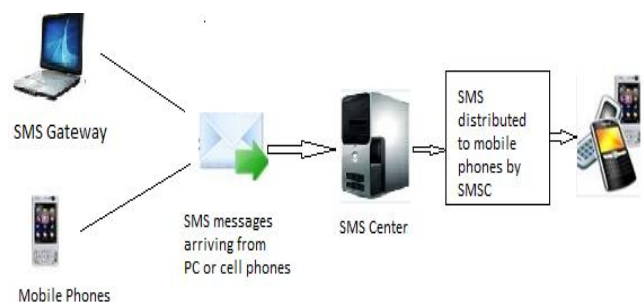


Fig. 2. SMSC Server

C. LBS Server

Location-based services (LBS) are a basic class of computer program-level entities that use location information to control features. These services consolidate a mobile device's position with other data so as to provide added value to a user. LBSs are information provisions available with mobile equipments through the mobile network and utilizing the ability to make use of the location of the mobile device.

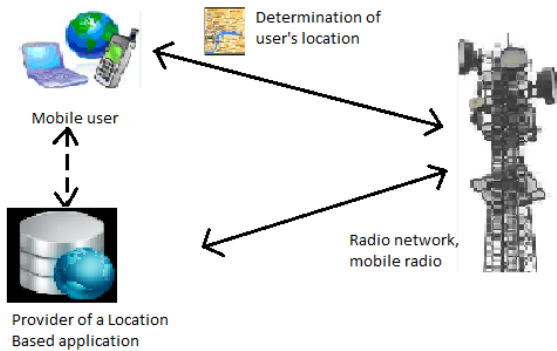


Fig. 3. LBS Server

D. Home Location Register (HLR)

HLR is the main database of permanent subscriber information. It is an essential element of CDMA, TDMA and GSM networks. Maintained by the subscriber's home carrier, the HLR contain appropriate user information including IMSI (International Mobile Subscriber Identity), MSISDN (Mobile Station International Subscriber Directory Number), Prepaid and Postpaid roaming restrictions, MSC/VLR and Supplementary services of each subscription. The HLR interacts with MSC, which is a switch used for call control and administration. The MSC also assists as a point-of-access to the PSTN (Public Switched Telephone Network). The third integral element is the VLR (Visiting Location Register), which maintains temporary database to update whenever new MS enters its area by HLR database.

When a user originates a call, the switching tool determines whether or not the call is coming from the user's home area. If the subscriber is out of the home area, the area VLR sends out a request for data in need to process the call. An MSC demands the HLR to identify the call for information, which it relays to the corresponding MSC, which in turn forwards it to the VLR. The VLR sends the routing Information back to the MSC which permits it to find the area where the call is initiated, and, finally, the mobile device to connect.

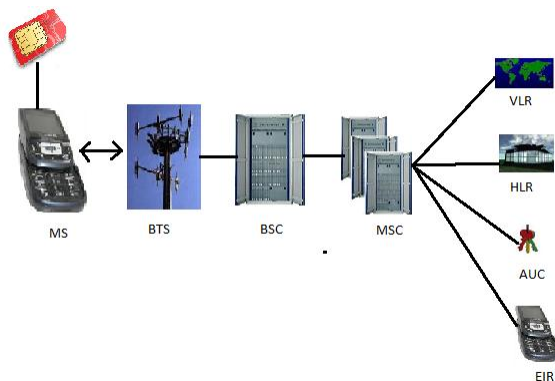


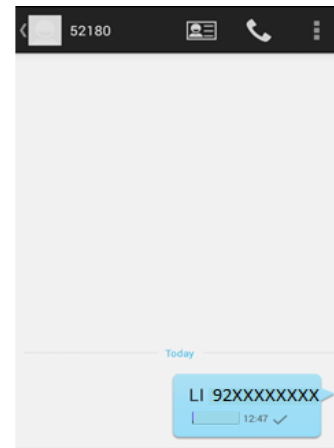
Fig. 4. Home Location Register

E. Software Used

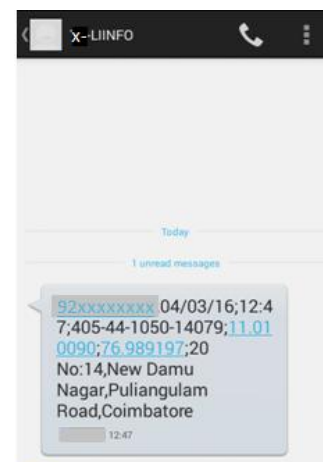
For the automation of the overall process, Scripting languages like PHP and Visual Basics are employed. PHP is a server side scripting language and its commands are carried out on the server. The main credit of using PHP is that it supports for wide range of database. VB is a high level programming language which is implemented on the .NET Framework. Linux will work for backend support.

IV. SIMULATION AND DISCUSSION OF RESULTS

The output for the following system can be obtained successfully as shown below.



//REQUEST



//RESPONSE

For the latitude and longitude obtained as a response for the requested mobile number can be checked by using Google maps as shown below.

//Verification Using Google Maps

V. CONCLUSION

Finding the location of a mobile number manually is a tedious and time consuming one. Because in manual location query, need to login each equipment separately to get the details to be communicate. But in automated system it doesn't require any user interruption in each equipment separately. This project represents a fast, reliable and an automated solution for the identification of mobile number location. It is seen that the latency in the overall performance of the system is reduced and this proposed system achieves the requirement within 30 seconds. Therefore the performance of the system gives greater satisfaction with low implementation cost and precise results.

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