

# Location Based Services using Android Mobile

M. Vijay

Student, Computer Science and Engineering,  
Saveetha School of Engineering, Thandalam, Chennai.

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**Abstract:** The motivation for every location based information system is: “To assist with the exact information, at right place in real time with personalized setup and location sensitiveness”. In this era we are dealing with palmtops and iPhones, which are going to replace the bulky desktops even for computational purposes. We have vast number of applications and usage where a person sitting in a roadside café needs to get relevant data and information. Such needs can only be catered with the help of LBS. These applications include security related jobs, general survey regarding traffic patterns, decision based on vehicular information for validity of registration and license numbers.

**Keywords:** Android, LBS, GPS, LCS, Google Maps.

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## 1. INTRODUCTION

Location based service (LBS) is emerging as a killer application in mobile data services thanks to the rapid development in wireless communication and location positioning technologies. Users with location-aware wireless devices can query about their surroundings (e.g., finding the nearest restaurant or all shopping malls within 5 miles) at any place, anytime. While this ubiquitous computing paradigm brings great convenience for information access, the constraints of mobile environments, the spatial property of location-dependent data, and the mobility of mobile users pose a great challenge for the provision of location-based services to mobile user. A Location Based Service (LBS) is an information and entertainment service, accessible with mobile devices through the mobile network and utilizing the ability to make use of geographical position of the mobile device. A LBS services can be used in a variety of contexts, such as health, work, personal life, etc. LBS include services to identify the location of a person or object, such as discovering the nearest banking cash machine or the where about of a friend or employee. LBS services include parcel tracking and vehicle tracking services. A Location Based Service (LBS) is an information and entertainment service, accessible with mobile devices through the mobile network and utilizing the ability to make use of geographical position of the mobile device. A LBS services can be used in a variety of contexts, such as health, work, personal life, etc. LBS include services to identify the location of a person or object, such as discovering the nearest banking cash machine or the where about of a friend or employee. LBS services include parcel tracking and vehicle tracking services.

## 2. LBS COMPONENTS

In order to make LBS services possible, some infrastructure elements are necessary, including mobile devices, applications, communication network, positioning component, and service servers [4]. Mobile devices are tools used by users to access LBS services, to send requests and retrieve results. Such devices can be portable navigation devices (PNDs), Personal Data Assistants (PDAs), laptops, mobile phones, and so on. Application is the interface for users to access the LBS service. It is usually software developed by an application provider, downloaded and installed on user's mobile device.

A specific application is usually developed for a specific LBS service. Due to the restrictions of mobile devices (small screen size, limited processor power and memory, battery capacity), LBS applications need to be lightweight and battery saving. Communication network refers to the mobile network which transfers service request from user to service provider, and requested information back to the user. Global System for Mobile communications (GSM) is currently the most common standard for mobile network and is used by majority of mobile phones globally. Mobile networks are usually controlled and

voice maintained by operators who provide connectivity for mobile users and charge them for data and transmission. A positioning component is usually needed in a LBS application to determine the location of user's mobile device. Most of the current LBS services do not require users to input location manually, like giving zip code or street name. Instead user's location can be obtained by using some positioning technologies, such as satellite positioning, cellular network positioning, WLAN stations or radio beacons. Service providers maintain service servers which offer different kinds of LBS services to users and are responsible for processing service requests and sending back request results. Servers calculate positions, search for a route, or search specific information based on user's position. Service providers usually do not store and maintain all the information requested by users. Instead, content providers are responsible for collecting and storing geographic data, location-based information, and other related data. These data will be requested and processed by service servers and then returned to users. Figure 1 (adapted from [4]) shows the interactions among these components, and the process of a LBS service. First, user sends a service request using the application running on mobile device (Step 1). The service request, with user's current location information obtained from the positioning component (in this example, GPS data), is sent to service server via the mobile communication network (Step 2). The service server requests geographic database and other related database to get required information (Step 3, 4). At last, the requested information is sent back to user's mobile phone via mobile communication network (Step 5, 6).

### 3. DISCUSSION

LBSs contain a number of components including maps and Geographic Information System (GIS) information, location collection services, and LBS application-specific subcomponents. The architecture of LBS can be generalized.

#### ***LBS Application***

This represents a specific application such as a "find my friends" application. This consists of a smartphone component, which has a number of sensors, and potentially a server component that includes application-specific data (such as location-tagged information).

#### ***LBS Middleware***

This wraps access to Core LBS Features (Location Tracking, GIS Provider and Location Collection Services) to provide a consistent interface to LBS applications.

#### ***Location Tracking***

This component stores the location trace of individual users. This represents a fundamental component in next-generation LBS as it contains the data that allows a user's route to be determined and potentially predicted.

In particular, this component would typically support the following Functionality:

1. Keep records on user's current and past locations.
2. Notify other components when a specific user has moved, or when they move in or out of an area. This supports location based notifications being sent to users.
3. Determine which users are within a defined location this supports geocasting features.
4. Queries of location trace to generate user movement models

#### ***GIS Provider***

This component provides geospatial functionality for many LBSs including map information, map visualization and directory services. Google Maps with its API can be considered a GIS provider.

#### ***Location Collection Service***

This component performs location collection to get a latitude and longitude for a specific user. Depending on the technology, this component may be accessed via the LBS Middleware (e.g., mobile network triangulation via a service provider) or directly (e.g., via GPS receiver in the Smartphone).

Android provides access to the above components to facilitate the implementation of LBS services through the help of following classes;

1. Location Manager
2. Location Provider
3. Geocoding
4. Google-Map

**Location Manager**

Location Manager Class of android is present to manage all other components needed to establish a LBS system.

**Location Provider**

Location provider represents the technology to determine the physical location i.e. to handle GIS. Location Provider component of Android application is a present to facilitate the determination of available provider and selection of suitable one.

**Geocoding**

Reverse Geocoding provides a way to convert geographical coordinates (longitude, latitude) into Street address and forward geocoding provides a mean to get geographical coordinated from street address. For forward geocoding we use `getLatitude()` and `getLongitude()` method as shown is the following code

Block

```
double latitude = location.getLatitude();
```

```
double longitude = location.getLongitude(); For reverse geocoding we use getFromLocation method with geocoder variable as shown is the following code
```

Block

```
//geocod is geocoder variable
```

```
addresses = geocod.getFromLocation(latitude, longitude, 10);
```

**Google Map in Android**

Android provides a number of objects to handle maps in LBS system like Map View which displays the map. To handle this Map Activity class is there. To annotate map it provides the overlays class. Even it provides canvas by which one can easily create and display multiple layers over the map. Moreover, sufficient provisions are there to zoom the map, localize the map by means of Map Controller. Following code-line shows the Map Handling in Android:

```
<com.google.android.maps.MapView android:id="@+id/map_view"
```

```
//specify different attributes/> // map controller
```

```
MapController mapController = myMapView.getController();
```

```
mapController.setCenter(point);
```

```
mapController.setZoom(1);
```

```
//List of present overlays
```

```
List<Overlay> overlays = mapView.getOverlays();
```

```
// adding a new overlays
```

```
MyOverlay myOverlay = new MyOverlay();
```

```
overlays.add(myOverlay);
```

```
mapView.postInvalidate();
```

**4. GPS IN ANDROID**

1. Built-in GPS receiver.
2. Requires 2 lines of codes.
3. Requires 1 XML file for properties.
4. System is responsible for updating location change.

**5. USE OF LBS**

Location-based services or LBS refer to ‘a set of applications that exploit the knowledge of the geographical position of a mobile device in order to provide services based on that information.’ 2

They can be classified in three categories:

**1. Public safety or emergency services:**

Since the location of the subscriber can be provided by the carrier, the mobile phone is a valuable access point in the times of emergency. In the US, Europe and Japan, it is mandatory by law for carriers to be able to provide such information.

### 2. Consumer services:

**a. Navigation** – users get route maps to a particular destination, real time traffic routing that takes into account actual congestion patterns etc.

**b. Location based advertising** – Advertisements of discounts or offers from a store as the user comes within the vicinity.

**c. Location based reminders** – Users can enter in to-do lists, whose location information is activated when the user passes by; for instance, pick up shopping or laundry etc.

### 3. Enterprise services:

LBS enables firms in fleet and asset tracking, field service dispatching, route and delivery optimization, and mobile workforce management. This has proved to be extremely useful for small and medium businesses.

## 6. ANDROID ADVANTAGE & LIMITATIONS

Advantages of an Android are listed as:

- Time for a change.
- Android scales to every device.
- It's supported by some hardware manufacturers and more to come in the future.
- Open source.
- Third party development is encouraged.

In contrast to advantages Android has following limitations:

- Not supported by any big company yet except HTC
- Does not support some applications like Firefox
- Some limitations exist in blue tooth.

## 7. CONCLUSION

Initially mobile phones were developed only for voice communication but now days the scenario has changed, voice communication is just one aspect of a mobile phone. There are other aspects which are major focus of interest. Two such major factors are web browser and GPS services. Both of these functionalities are already implemented but are only in the hands of manufacturers not in the hands of users because of proprietary issues, the system does not allow the user to access the mobile hardware directly. But now, after the release of android based open source mobile phone a user can access the hardware directly and design customized native applications to develop Web and GPS enabled services and can program the other hardware components like camera etc.

The LBS application can help user to find hospitals, school, gas filling station or any other facility of interest indicated by user within certain range. Just like a GPS device its location will also be updated as soon as user changes his/her position.

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