



# The Arrival of Location-Based Services

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Location-based services (LBS) need to offer performance, value and usability. LBS performance is the accuracy with which a cell phone's location can be pinpointed, by its coverage and its ability to obtain a location fix. A LBS's value depends upon its ability to provide the needed information in a usable form. LBS can be expected to have a significant impact upon SMEs helping them with a variety of tasks from marketing to keeping track of deliveries, personnel and goods.



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The arrival of location-based services in the Asia-Pacific region is bound to have a significant impact upon small and medium enterprises in the region. In many areas, wireless is the only practical, cost effective way to roll out telecom services. Indeed, in much of the region mobile service are growing faster than fixed -line services and it is only a matter of time before wireless telephony is the dominant service throughout the region. The arrival of wireless location-based services will help smaller businesses with a variety of applications that require information about the routing, navigation and tracking of people, goods and vehicles and will, among a host of other innovative applications, permit specialised firms to offer personalised health, safety and security services.

The need to know the location of people, places, and things will continue to be a fundamental element of our existence. Whether it is locating the nearest point of interest, locating a child, a valued possession or co-workers, location is something we rely on every day to run our personal and professional lives.

It has been more than a decade since the introduction of commercially available

wireless location technology. Today location has begun to take root in wireless communities around the world. It is clear that location will be a part of the future wireless experience, however there are still questions about what is needed to make location more valuable to the broadest base of people.

A look at the existing services and already implemented location technologies, helps answer some of these questions. The performance deficiencies of certain location calculation technologies have resulted in poor user experiences. This, combined with applications that offer only limited value, have negatively affected location-based service (LBS) acceptance. High performance, high precision accuracy, any-phone location technologies are now available to resolve these issues. This should help provide more interesting and higher value applications and make wireless LBS an indispensable utility for consumers and commercial entities alike.

A high quality user experience has been, and continues to be, critically important to wireless users, regardless of what service or application is being delivered. Market analysis repeatedly confirms this assertion. There are numerous case studies in wireless

that exemplify this truth. Examples include cordless cellular hybrids with chronic handover and billing problems, and the early digital 8k transcoders that delivered very poor voice quality. Both of these technologies hampered The acceptance of both of these technologies was delayed higher quality products could be developed.

This phenomenon is true for location-based services as well. Many operators recognise that the end users are not completely satisfied with the location services currently being offered. Some of the complaints are related to location performance and include inconsistent coverage, poor accuracy and slow delivery of location information. Some of the other issues are qualitative in nature and revolve around interest and importance of the service being provided as well as the ease of use of the service. Adoption of higher performance location services that address three issues – improved location system performance, improved value of the service, and improved service usability – will help

These issues are interdependant. Services that lack location performance can suffer. Similarly it can be expected that even if location performance is available, services that do not provide enough value, or are too



**Figure 1: Keys for Location-Based Services**



difficult to use will likely suffer. In short, location providers must not only address the technical aspects of providing location information, but must also address the emotional and physical issues that are important to the end user.

So how are each of these characteristics – performance, value and usability – defined in the location world and how does each relate to the success or failure of a particular service?

**Location System Performance**

The most straightforward quantifiable characteristic is performance. In the location world, there are two critical factors that define a system’s performance: accuracy and consistency. Accuracy, the most obvious of the two, refers to the radius in which a location technology can pinpoint the location of a cellular phone or device. Consistency is equally important. Consistency is a function of two factors: coverage and yield. Coverage refers to the area in which location service is available, and yield refers to the technology’s ability to obtain a location fix.

The extent to which these two performance factors are met is critical to LBS success. The reasons are fairly obvious. When trying to pinpoint a loved one, a piece of personal property, or a point of interest, precision is important especially in very dense urban areas. This holds true for most location-based applications, but is particularly critical for safety applications. Additionally, services that have limited coverage areas or have restricted yield due to obstacles or poor indoor coverage do not meet customer needs well due to

intermittent service availability.

The importance of accuracy is exemplified in areas where Cell-ID location technologies have been implemented. Cell-ID and its somewhat more accurate brother, Enhanced Cell-ID, take advantage of closely spaced cell towers and approximate the location of a caller based on which cell the phone is communicating with. These systems, however, are not known for their accuracy or consistency. Currently, Cell-ID is widely used in both the European Union and Asia-Pacific region for consumer-targeted location-based information applications (“Find the Nearest”). Cell-ID’s poor accuracy, though, and limited coverage area (outside of dense urban areas Cell-ID accuracy degrades to several kilometres) are cited by wireless operators as limiting the success of their location-based services.

Accuracy without yield is similarly problematic, as seen in areas where Assisted GPS (A-GPS) handsets have been deployed to enable location services. Operators implementing these technologies are pleased with its accuracy in unobstructed areas, but where obstructions exist – usually where usage is the highest – as in cities or indoors, their performance suffers. Wireless operators testing A-GPS say: “We are tired of telling our customers to go stand by the window to be located.” Service interruptions and limited reliability make it difficult for wireless operators to offer some of the more promising, high-value location applications such as Personal Security, Medical Emergency, and Asset Tracking, where location success is critical and limitations are not acceptable.

Of note, is a relatively new network based location technology called U-TDOA (Uplink Time Difference of Arrival) that is being used in the US for Emergency-911 location. The technology combines consistent coverage in all environments with accuracy similar or better than provided by A-GPS phones, but with a much better yield. This technology additionally provides the added advantage of locating all existing and future phones without phone modification, and shows promise for meeting the performance needs of a very broad base of location services and applications (Figure 1). The ability to locate all legacy handsets has a significant financial benefit to carriers: they can deploy services that can immediately be used by all of their subscribers instead of launching niche handset specific applications. Finally the ability to locate any phone on the network propels community location services such as friend finder.

U-TDOA location technology, now standardised for GSM, is being deployed nationally by the US’s three largest GSM operators, and is available to support commercial location-based services. The massive deployment of U-TDOA location technology in the US will have a huge pull effect on application developers who now can see an immediate 60 million plus subscriber market opened up with U-TDOA’s any phone location capabilities.

**The Importance of Value**

U-TDOA provides precision accuracy for any phones in any environment, but performance alone does not guarantee a successful service. It is the services themselves, and the relative value that they bring the user, that is the second key to LBS success.

The services themselves must hold the user's interest and provide a combination of personal appeal and intrinsic value to be successful. To date, the largest percentage of applications, while appealing, would rank relatively low in importance (see Figure 2). Some of the services on offer include, friend finder, dating service, find my nearest applications. With the exception of a few very sticky niche applications such as the pursuit game, BotFighters, most of the applications are only somewhat appealing, are not considered a ‘must have’ by the end user, and may not garner any significant revenue.

Some applications that hold a great deal of promise for the future combine a high degree of importance and appeal. Tracking applications are a very good example. Most consumers would be willing to pay a reasonable amount of money to know the exact whereabouts of our loved ones and prized possessions. The concept is appealing and the information is important to us and together this creates a valuable application. With high-performance location technologies, such as U-TDOA, these applications and services can now be delivered, and it is in the areas that combine appeal and importance where some operators expected to be able to begin to generate substantial revenue. This sentiment was shared as recently as this spring at an international LBS conference in Europe, where one of the keynote speakers, an executive from an international wireless operator, quoted routing and navigation, enterprise and tracking, and safety and security, as three application areas viewed as areas of expansion. Reasons given, included value to the end user, importance or criticality of information and appeal to the enterprise market segment. (See Figure 2)

Figure 2:



Figure 3:



**The Importance of Usability**

The last factor, and one that is all-too-often forgotten, is the usability of a service or application. Typical product development cycles tend to focus on features and technology, and frequently overlook the human element. It is this human element that can lead to the success or failure of a given service or application. In wireless, services such as voice-based information services (411), have achieved marked success partially because they are simple to use and provide the performance and value that the customer requires. However, for every positive case study there are countless negative ones, WAP on small black and white screens being the most recent.

Usability is a function of the end-user experience. Factors that negatively affect the end-user's experience may eventually lead to lackluster success figures. This is exemplified with some of the location-based services that have already been enabled. Many services that rely on Cell-ID technology require the user to enter additional information about location, such as the nearest cross street, before any quality information can be displayed. This

is time consuming and frustrating when working with a phone's interface. Frustration has also been voiced by services using A-GPS handsets, which beyond the previously mentioned problems in obstructed areas, are finding that in areas of good coverage, it can take a relatively long time (up to a minute) to calculate a location and receive any relevant information. In short, even if a service or application can provide high value information with a strong level of interest, if experience of accessing that service is unpleasant, the long-term success of that service is in jeopardy.

The provision of location for wireless subscribers is something that many in wireless expect to be a fixture of our industry in the years to come. As things stand today the industry is still in its infancy and has huge growth potential. Location information has intrinsic capability to add value, context, and greater levels of personalisation to all wireless applications and services. It ties in very well with wireless operators existing service and data strategies. Imagine the impact of adding simple location information to popular services such as

MMS (multimedia message service). Not only can someone send a picture to show the action, but by attaching a location 'link' or 'bookmark' they can tell their friends exactly where the action is. Providing location context information with high volume services such as MMS can have a huge impact on ARPU (average revenue per user) as it triggers follow up usage and the sale of related services.

Most of the attention surrounding location-based services has involved the relative performance of different location technologies, but the importance of value and user experience must not be overlooked. In addition to selecting a technology that provides the proper combination of accuracy and consistency, the location technology service must have value by providing relevant, needed and appealing information and be delivered in a package that is easy to use, easy to operate and understand (See Figure 3). It appears that U-TDOA location technology holds the answer to location performance and combining this type of performance with usable and valuable applications that have appeal and meaning may be the keys to future success □