Dialogic®

Grow Revenue and Reduce Time to Market with Dialogic® Building Blocks

Location-Based Services

Executive Summary Head

Wireless service providers worldwide are continuously trying to stay competitive and increase their revenue per subscriber by bringing profitable and reliable value-added services to market quickly and inexpensively. In recent years, applications such as short message service (SMS) and color ring back tones (CRBT) have flourished in the consumer market, especially in Asia-Pacific and Europe.

Another mobile application poised for strong growth in the consumer and business markets is location-based services (LBS). Developing with flexible building blocks is ideal for this technical and economic challenge.

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Introduction

Location services come in several categories ranging from "opt-in" advertising to finding local services. What these applications have in common is the need for service providers to use signaling technology such as Signaling System 7 (SS7) to

- Authenticate subscribers

- Look up their locations

- Create communications links with the application servers

In addition, high-availability, high-density components are required to host and process LBS.

LBS applications work by providing data based on the location of the mobile subscriber. These can be segmented into "push" and "pull" models.

"Push" Location-Based Services

In these services, local information is proactively sent to visiting subscribers. "Opt-in" mobile advertising is emerging as an effective way to send discounts, promotions, and contests to consumers who agree to receive such alerts.

Many of these messages are text-based via SMS; however, multimedia messaging service (MMS) is beginning to be used for this type of proactive application as well.

"Pull" Location-Based Services

These services are used by subscribers to retrieve area information. Examples of these deployments include:

- **Driving directions** – Get turn-by-turn directions from your location to your desired destination

- **Maps** – View maps on your phone detailing your current location

- **City guides** – Find local ATMs, restaurants, stores, and attractions

- **Weather** – Get the local forecast

- **Traffic** – View local traffic conditions and alternate routes

- **Friend finder** – Query the location of other mobile subscribers

- **Child tracking** – Safety device in which the location of children can be tracked

What is the Demand for Location-Based Services?

Although the concept of LBS has been around for several years, applications are now poised for strong growth in the consumer market due to improvements and standardization of positioning technologies in 2.5G and 3G networks, including Global System for Mobile Communications (GSM)/general packet radio service (GPRS), code division multiple access (CDMA), and universal mobile telecommunications system (UMTS). These networks use methods such as cell ID, angle of arrival, time of arrival, and radio-frequency characteristics to pinpoint subscriber locations. For an even greater accuracy, hybrids of these techniques might be used.

Applications, such as friend finders, city guides, and driving directions, have already been deployed in Asia-Pacific market segments. In the U.S., early demand for LBS will be driven by the deployment of FCC-mandated Enhanced 911 (E911), in which mobile carriers must provide emergency services that include the callers' geographic position. Because of the potentially significant capital costs in complying with this mandate, wireless carriers will look to use commercial applications to provide a return on the investment in infrastructure.

The European market is also poised for strong growth in location-based services. The forecast is that the LBS market, a €108 Million industry in 2004, will grow to over €2 Billion by 2009 [Berg Insight].

Another indicator of strong growth potential is the consumer demand for LBS. In a study [In-Stat/MDR], 85.6% of U.S.-based wireless subscribers expressed interest in one or more LBS applications. They also specified their top LBS preferences, shown in Table 1.

Ultimately, the primary drivers for consumer LBS applications are enjoyment and convenience [Juniper]. For businesses, efficiency and safety are the key drivers. Applications such as city guides, traffic, and weather have appeal in both the business and consumer areas.

Additional market drivers based on Juniper's data include:

- The need for mobile carriers to increase (or maintain) average revenue per subscriber (ARPU)

- The perceived value of location as an additional dimension in many mobile data applications since it adds context to other information
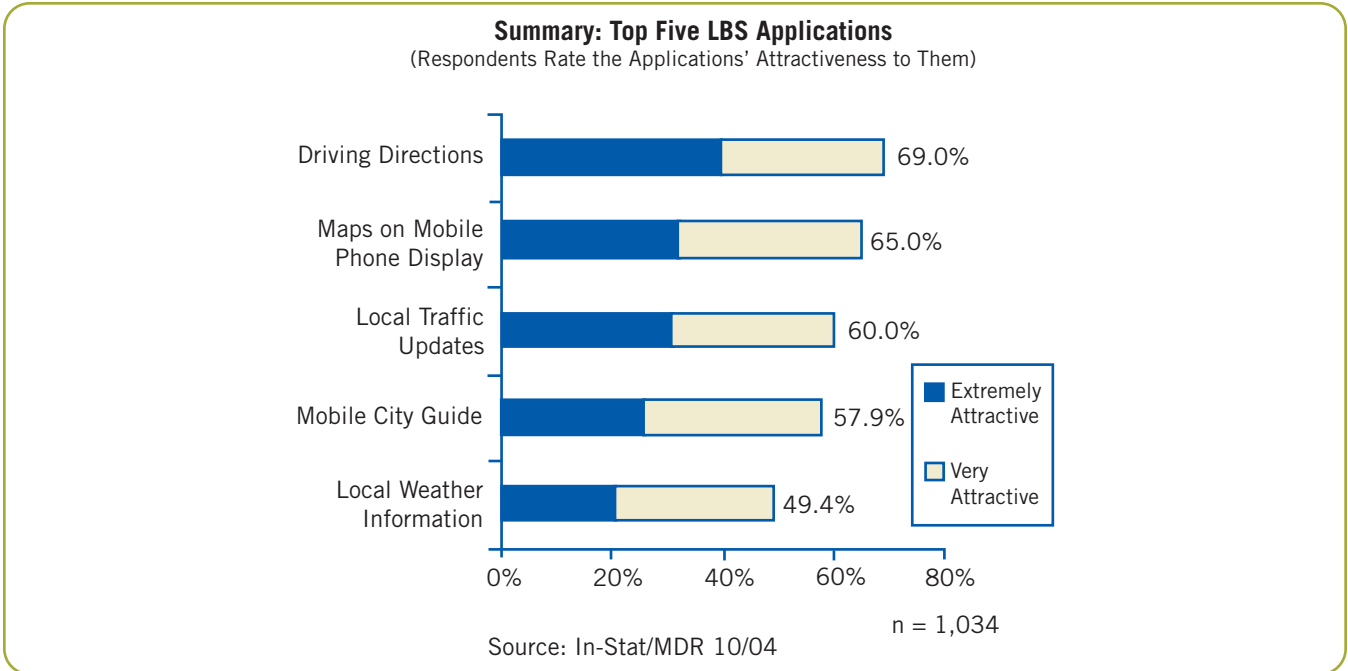
Summary: Top Five LBS Applications
(Respondents Rate the Applications' Attractiveness to Them)

Application	Score
Driving Directions	69.0%
Maps on Mobile Phone Display	65.0%
Local Traffic Updates	60.0%
Mobile City Guide	57.9%
Local Weather Information	49.4%

Legend:
- Extremely Attractive
- Very Attractive

n = 1,034

Source: In-Stat/MDR 10/04

Table 1. Top Five LBS Applications (Respondents Rate the Applications' Attractiveness to Them)

- The deployment of higher bandwidth (2.5G and 3G) networks offering a better environment for graphically rich data services, as well as better availability of handsets compatible with high accuracy positioning

- Government mandates requiring delivery of more accurate location information be delivered to emergency service providers in some parts of the world (as with the E911 example in the U.S.)

According to the Juniper study, the total available LBS or mobile location-based services (MLBS) market is estimated to grow from under US$1 Billion at the end of 2005 to over US$8.5 Billion by the end of 2010, with the largest market segment being Asia-Pacific, followed by Europe and North America. Other regions such as South America also show fast growth, as shown in Table 2, but with a smaller customer base.
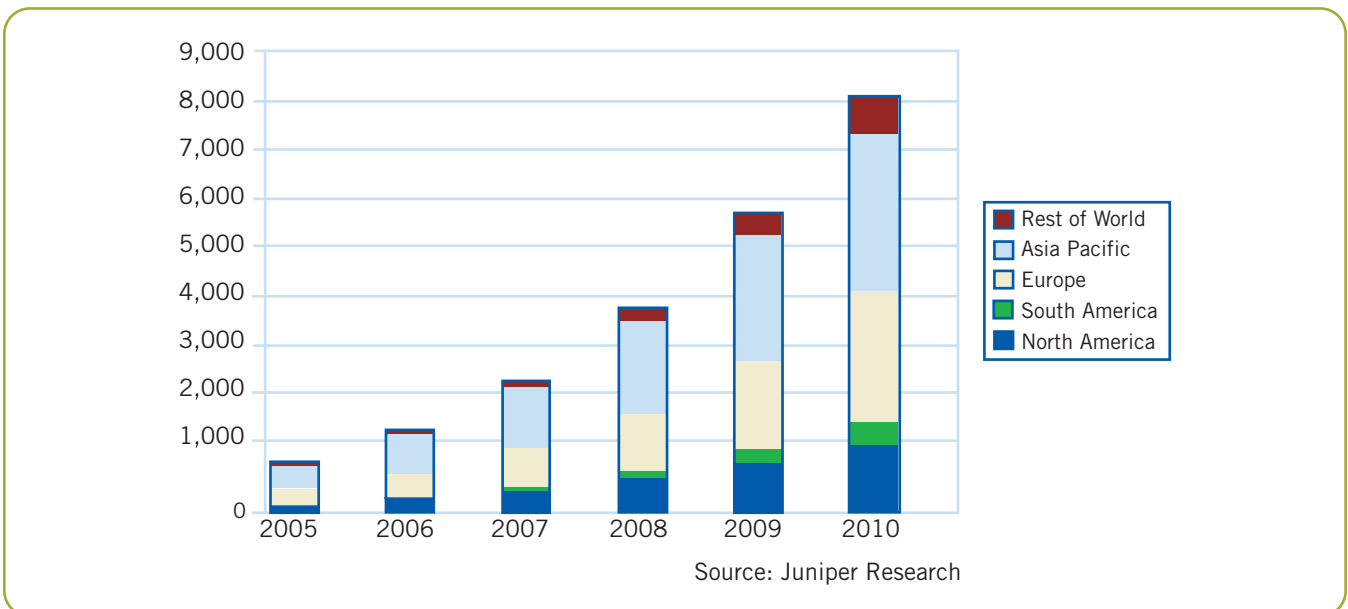
Legend:
- Rest of World
- Asia Pacific
- Europe
- South America
- North America

Source: Juniper Research

Table 2. Total MLBS Revenues Available from All Mobile Subscribers: Regional Forecast 2005–2010 (US$M)

Mapping Out an LBS Application

Consider a simple, yet powerful, example of an LBS: a city guide. Through simple text commands or an interactive voice response (IVR) system, tourists and business travelers can query a database to find nearby services, such as a restaurant. Once a restaurant is selected, the same portal could be used to connect to a local taxi service. If the user already has a car, the guide could provide traffic conditions or an ideal route to get to the restaurant. Because the city guide application is working with a location gateway, these transactions can all be accomplished without the subscriber needing to enter address data.

Figure 1 shows a simplified diagram of the components of a LBS deployment. These core elements enable the processing and transportation of presence-based content between the application environment, the mobile network, and the user.

- How can this service be launched quickly to gain a competitive edge?

- How can financial risk be mitigated?

- How can the investment in new hardware and software be used as technology needs change?

The classic quandary of producing new value-added applications in a timely manner, while keeping capital expenditures under control, is best addressed by adopting a flexible development framework using building blocks. The framework features standards-based components designed to enable communications applications while providing the following economic benefits:

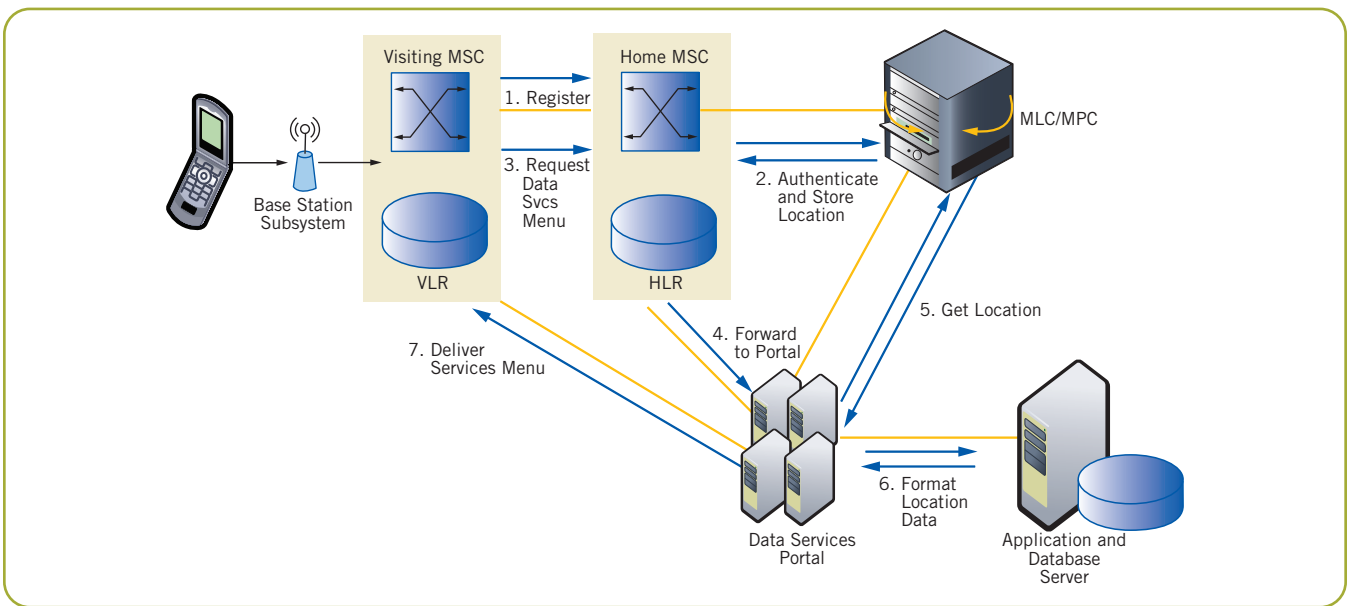- **Faster time-to-market** by using components based on open standards that have been tested for interoperability.

Figure 1. Sample City Guide Deployment

In addition to the familiar mobile switching center (MSC), home location register (HLR), and visitor location register (VLR), there is also the mobile location center (MLC) and mobile positioning center (MPC). These act as gateways between the mobile network and the LBS application and calculate the location of the mobile device.

Deploying Location-Based Services Using Building Blocks

After examining the various elements that comprise an LBS application, some technical and economic issues might arise.

- **Reduced capital costs** by reusing components in multiple solutions. For example, in addition to LBS, a solutions provider could use the same chassis and communications boards for other mobile applications such as SMS and CRBT.

- **Greater flexibility and resilience** because modular building blocks are based on open standards; therefore, they can be upgraded or reallocated as market segment demands evolve. This saves the time and expense of deploying a new custom proprietary platform when solutions providers want to introduce new applications.
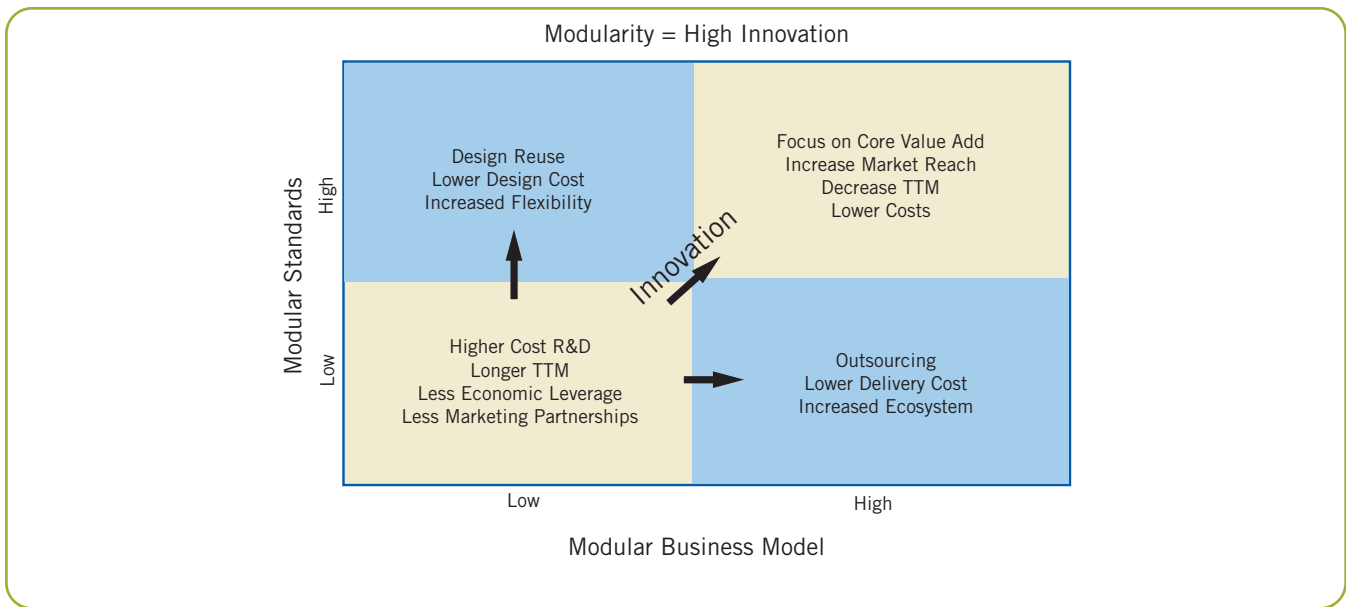
Figure 2. Benefits of a Modular Model

As Figure 2 represents in its quadrants, adopting a modular network methodology frees up precious capital and development resources and enables the service provider to focus on its core values.

Creativity and Modular Components – The Keys to a Fast and Profitable LBS Launch

An LBS would typically be enabled by application and media servers, which produce the end-user content. If the application is anticipated to generate high volumes of traffic, several hardware considerations must be made in order to design a reliable environment.

- **Carrier-grade chassis** — Look for platforms with redundant fans and power supplies, as well as redundant chassis management modules that enable service providers to remotely manage multiple single board computers (SBCs) and conduct diagnostics for enhanced system reliability. In addition, look for chassis that support high-availability capabilities like peripheral hot swap (PHS) and redundant host.

- **SBC boards** — The chassis should be complemented by high-performance, high-density SBC boards that are designed to reliably process multiple LBS transactions. These boards should be redundant to remove any single point of failure. When using a platform that supports PHS, boards can be replaced while the LBS application is running, minimizing service interruptions.

- **Media processing boards** — If the LBS application uses multimedia components, such as voice or video, a media server with media processing boards will be needed to transmit the LBS content. For example, if the location service is driven by an IVR, the media processing components will play the interactive menu and any supporting information: "The closest automatic teller is located at…".

- **SS7 signaling boards and gateways** — SS7 signaling is used to transfer the necessary requests and application data between the nodes shown in Figure 1. The application environment must have the proper SS7 interface boards and protocols in order to interface with the mobile network. Signaling gateways can run a wide range of SS7 protocols and local variants, enabling worldwide deployment in a variety of applications. For applications such as LBS, gateways should combine high-density, high-performance SS7 signaling boards, plus the ability to establish dual chassis environments for maximum availability.

With the marketplace for LBS poised for strong growth worldwide, it is important to enter this competitive area with the proper tools.

The most significant tool is, of course, a marketable LBS application. It has been suggested that successful LBS offerings will be ones that use location data as an enabler [The Yankee Group], incorporated into more comprehensive applications. Examples include integrating

location data into gaming, alerts, mass-transit schedules, favorite options, and entertainment. It is also recommended that the business market segment be considered, as the demand for LBS there will outpace the consumer market segment.

The other necessary tools are those that comprise the LBS infrastructure. The passing of information between the HLR/VLR, as well as between the LBS servers and the mobile devices, is heavily reliant upon robust signaling components. In addition, the application server must have high-availability/high-density features to meet the demanding amount of subscriber transactions.

The challenge of establishing such an application without being late to the marketplace can be addressed by adopting a flexible development framework using building blocks. Besides the advantages of design flexibility, faster time-to-market, and cost-effectiveness, modular building blocks can be redeployed for new applications as market segment demand evolves.

Modular Communications Building Blocks from Dialogic

Dialogic provides a wide variety of modular building blocks for LBS including compute, packet, and media processing boards; switches; chassis management modules; and accessories. Based on industry standards, these products support carrier-grade, high-density, NEBS-3/ETSI-compliant computing solutions featuring high-availability, hot-swappable components, and computer telephony capabilities. They can be used by service providers to develop powerful, cost-effective solutions for a diverse set of wireless network applications.

The higher level of integration offered by these products can be particularly valuable when time-to-market is critical and internal engineering resources are constrained.

Summary

The use of board-level products can free up resources, enabling service providers to focus their efforts further up the value chain; on software development, for example, or on network integration. By delivering leading-edge, high-performance products at multiple levels of integration, Dialogic helps service providers tailor their design efforts to make the most efficient use of internal resources and expertise, while making it easier for them to meet rapidly changing requirements.

References

[Berg Insight] The Structure of the European LBS Market 2005, July 2005

[In-Stat/MDR] Consumer Demand for Location-Based Services, Report No. IN0401660MCD, November 2004

[Juniper Research] Location: Mobile, June 2005

[Yankee Group] Mapping Location-Based Services, November 2004

Acronyms

ARPU	Average revenue per subscriber
ATM	Automated teller machine
CDMA	Code division multiple access
CRBT	Color ring back tone
ETSI	European Telecommunications Standards Institute
FCC (USA)	Federal Communications Commission
GPRS	General packet radio service
GSM	Global system for mobile communications
HLR	Home location register
IVR	Interactive voice response
LBS	Location-based services
MLBS	Mobile location-based services
MLC	Mobile location center
MMS	Multimedia messaging service
MPC	Mobile positioning center
MSC	Mobile services switching center
NEBS	Network equipment building system
PHS	Peripheral hot swap
SBC	Single board computer
SMS	Short message service
SS7	Signaling System 7
UMTS	Universal mobile telecommunications system
VLR	Visitor location register

For More Information

For more information, please visit the following Web pages:

Dialogic® Building Blocks

http://www.dialogic.com

Dialogic® SS7 Signaling Products

http://www.dialogic.com/products/signalingip_ss7components/signaling_software.htm

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