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White Paper

A Strategy for Effective Deployment

of Wireless Location Services

Contents

Introduction

This paper presents a strategy to support wireless carriers and network operators interested in offering wireless location services to their subscribers.

This strategy is:

- Broad: capable of supporting various carrier and subscriber requirements

- Flexible: changeable with market conditions, not locking a carrier into one method or a proprietary, "spot solution"

- Maintainable: based on open standards and supported products, not a custom programmed solution

The following pages describe how Autodesk LocationLogic supports carrier and subscriber requirements, and then presents our strategy for deploying location-based services.

Support of Carrier Requirements

Wireless carriers and network operators need to offer an array of services that:

- Can be deployed with **minimal effort and expense**

- Are supported on a **stable, standards-based platform**

- Have a **short development cycle**

- Offer **multi-lingual support**

Here is how Autodesk LocationLogic supports each of these important carrier requirements:

Minimal Effort and Expense

Applications access LocationLogic's services and integrated carrier network components through a multi-tiered API. A rich Java API and an optimized, XML-based remote API free the developer from the effort of integrating network infrastructure components, such as LDT, and managing low-level tasks, such as multiple database connections and transactions. This

framework allows the developer to focus on creating applications that satisfy end user requirements.

Stable, Standards-based Platform

LocationLogic is proven technology for wireless carriers and operators planning to develop and deploy customized location-based services. It provides the network connectivity, location-enabling services, and tools to deliver reliable, high performance applications.

LocationLogic offers extensive functionality, including core geo-services (such as spatial query), static and dynamic content management, mobile device management, location-sensitive event notification services, and more.

Deployed with a J2EE application server, LocationLogic is implemented as a set of server-side components with the various tools used to administer and manage them. These functional components are used, for example, to determine a mobile user's current location, calculate optimized travel directions, generate device-appropriate maps, and notify a user of a particular location-sensitive event such as a friend or traffic incident nearby.

A single data store internal to the platform is used by these components for maintaining street network data, Points of Interest (POI), and geocoding information at global scales. This database is also used to manage and store unique subscriber information, such as current location, location history, location favorites, and other location-relevant personal data and end user application preferences. In addition, a data-linking technology in LocationLogic provides allows direct linking to location-relevant personal data stored in external systems.

Short Development Cycle

Taken together, the LocationLogic characteristics and features described above allow new wireless location services to be developed and deployed in a matter of weeks, not months.

Support for industry-standard protocols (such as Parlay/OSA, LIF MLP, OpenLS, and AAI) shortens the learning curve. In addition, Autodesk provides a Service Creation Environment with developer toolkits for rapid application development.

Multi-Lingual Support

Carriers operating in more than one country, or countries where more than one language is spoken will have a market advantage if they can meet the needs of the largest potential number of subscribers.

LocationLogic integrates with and stores large multilingual data sets of POI features, street and road networks, and base map data. One such database stores almost a million POIs throughout 19 European countries. An extensible database schema also supports dynamic content, such as up-to-date traffic, news, weather, and other subscription services.

Support of Subscriber Requirements

Subscribers demand wireless services that:

- Are **useful and appealing**

- Work on **multiple communication channels**

- Offer **personalization**

- Maintain their **privacy**

- Give them the **ability to control participation**

Here is how LocationLogic supports each of these important subscriber requirements:

Useful and Appealing Services

Well-built wireless location services increase subscriber productivity, convenience, and safety, at work or play.

Use of personalized, value-added services also help bind the subscriber to the carrier; increasing customer loyalty and reducing subscriber churn.

Multiple Communication Channels

Subscribers want to use the channels that are most convenient or most familiar to them. Supported communication channels for LocationLogic include SMS, HTML, WAP, J2ME and email. An application framework, which separates business logic from presentation, enables the adoption of new channels of access. Examples of new channels include MMS and interactive voice recognition (IVR).

Personalization

Subscribers want to customize services based on their personal preferences. Location Connect applications offer the following personalization features to the subscriber:

- Search and routing preferences
- Managed "buddy lists" and friend alerts
- Bookmarks and favorites
- Scheduled traffic alerts
- Turn location services on/off for privacy

Privacy

Subscriber privacy is a sensitive topic, and will likely remain so. Applications developed using the LocationLogic platform provide for privacy assurance management, allowing users to hide their location if desired.

User management is part of every service built upon LocationLogic, allowing users full control over the visibility of their location information. Users can specify who can access their location and when their information is public.

Ability to Control Participation

Subscribers want the ability to control their participation in services. LocationLogic privacy support includes an "opt-in" model, where a user has the ability to opt in if they want to be included. For example, with the Autodesk Friend Connect application, the user can "opt-in" when they want to allow Friends to know their whereabouts, and "opt-out" when they don't want to be disturbed.

LocationLogic allows for an explicit grant of permissions by the user. For example, in Friend Connect, a subscriber must explicitly give permission before another user can locate them. This explicit grant can be given only to the user's friends, while excluding all other subscribers from knowing anything about them.

Our Strategy: Four Options

Autodesk Location Services gives operators four ways to deploy wireless location services:

1. Deploy Market-Ready Services

Autodesk Location Connect is an off-the-shelf application suite that gives operators a variety of easy-to-use, location-sensitive applications for their consumer and enterprise customers. Providing new wireless data services to mobile individuals, these applications emphasize ease-of-use and reliability.

2. Location-Enable Existing Services

Operators can offer increased value to subscribers and generate new revenue by adding location to existing wireless data services such as alerting, instant messaging, or directory services.

Autodesk Location Services applications are developed using standards-based technologies such as Java and XML, to facilitate integration with existing applications.

3. Use Third Party Applications

Wireless carriers may have preferred technical services vendors or third party developers. The service creation environment provided by Autodesk LocationLogic enables third party developers to rapidly develop applications that can be supported on multiple devices.

Autodesk Location Services offers a comprehensive support program to developers building wireless location services upon Autodesk LocationLogic.

4. Create New Services

Autodesk LocationLogic gives carriers these tools for in-house rapid development of new location-based services:

- A powerful, highly scalable geo-services platform

- An open, extensible API and object-oriented Java framework

- Location-based content (including base maps, points-of-interest, and real-time traffic data) via partners

Deploy Market-Ready Services

Autodesk Location Connect is a market-ready suite of applications that operators can offer to their subscribers right away. This suite of integrated location-based services includes business and entertainment finders, a friend finder, and a traffic information service. All applications are accessible via HTML, SMS, and WAP. And, all applications allow subscribers to generate and send step-by-step walking or driving directions, and to view maps.

Available services include:

Business Connect

Business Connect allows subscribers to search for business listings closest to their current location: by category, by name, or by choosing from a list of favorites.

Once a subscriber has selected a Point of Interest (POI) using any of the above methods, its details are displayed. They can then get either directions or a map based on their current location to the POI.

Entertainment Connect

Entertainment Connect allows users to search for entertainment options closest to their current location. The application includes the same functionality as that described for Business Connect above.
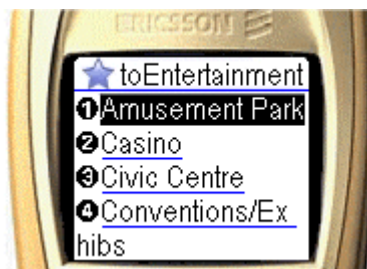
Directions Connect

Directions Connect lets subscribers generate and send directions, and view maps:

- Select start/end points (current location is default start point).
- Set endpoint as your location (route people to you).
- Get step-by-step directions with maps.
- Get directions to Favorites or previously visited places.
- Get directions to addresses in Address Book.
- Send directions to others via SMS or email.
- Set mode of transportation – walking or driving.
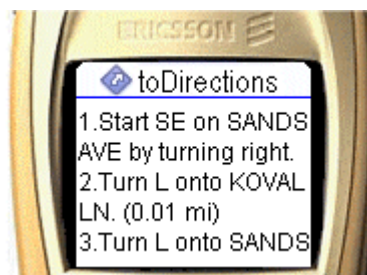
Friend Connect

Friend Connect allows subscribers to locate nearby friends, contact them, establish a convenient meeting place, send them maps and directions, and receive alerts when Friends are nearby.

Traffic Connect

Traffic Connect gives subscribers the ability to get regular traffic reports on pre-defined routes, or spontaneous alerts on traffic conditions ahead.
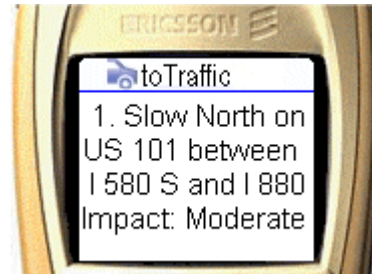
Location-Enable Existing Services

In many cases, operators can increase the value of their offerings and get additional revenue simply by location-enabling existing services.

The use of standards-based technologies such as Java and XML by Autodesk Location Services facilitates the integration of location with existing applications.

For example, routing, directions, and mapping functions could be added to an existing business lookup service. Messaging or alerting services can be made location-relevant. Or a roadside assistance service can be enhanced by providing distances and directions to gas stations, automobile repair services, or motels.

Introducing and marketing new services to subscribers requires a substantial marketing investment. Then subscribers must learn about, purchase, and figure out how to use the new service.

Enhancing services that subscribers are already familiar with minimizes carrier investment and shortens the learning curve for subscribers, fostering quick adoption and revenue gain.

Use Third Party Applications or Create New Services

A service creation environment provided with LocationLogic empowers developers—either third-party or in-house—to leverage existing application functionality and build new applications quickly, accelerating the time to market.

Specifically, the environment consists of application components, tools, APIs and documentation that a developer needs to build and deploy a location-based service.

It supports building applications using industry-standard, open technologies. A developer can use any of the commonly available Java development technologies to create applications with the LocationLogic Java API: Java Servlets, Java Server Pages, JavaBeans or Enterprise Java Beans and XML.

The LocationLogic Java and XML APIs provide optimized environments along

with the right tools for building location-based applications.

Building Blocks

LocationLogic's development environment combines best practices with application building blocks and can be used as the underlying architecture on which wireless location services are developed. Tag libraries to accelerate GUI development are included, as is internationalization support.

This framework promotes efficiency and rapid service development through the use of generic functions as well as by access to reusable component-based services common to location-based applications.

Multi-tiered API

Applications access LocationLogic's services and integrated carrier network components through a multi-tiered API. A rich Java API and an optimized, XML-based remote API free the developer from the effort of integrating network infrastructure components, such as LDT, and managing low-level tasks, such as multiple database connections and transactions. This allows the developer to focus on creating applications that satisfy user requirements.

Java API

A set of Java classes and interfaces provide application-access to both the functional components in LocationLogic platform, and to application business logic components. The platform API can be used to perform operations such as manipulation of content and administrative functions, and session and user management.

The API also allows access to the business logic components, which wrap commonly used application features into reusable building blocks.

The API supports multiple channels, including WML, HTML, and SMS applications, including stylization of content for different types of wireless devices. An interface to the LocationLogic location-enabled SMS Gateway is part of the service creation environment. It supports industry-standard protocols for connecting to a carrier's network infrastructure.

The service creation environment also includes template applications for creating new services quickly, and can be used with the most popular integrated development environments (IDEs).

XML Web Services API

As a complement to the Java API, LocationLogic offers an open and standards-based XML API that is an efficient, optimized and preferred means for remote application development. The XML API exposes LocationLogic functionality as Web Services for interacting with the platform's most common service operations. These include geocoding, content searching and navigation, spatial query and generation of routes and maps.

Developers integrate applications using toolkits included with LocationLogic to invoke XML-formatted requests sent over HTTP/HTTPS to LocationLogic's remote server interface. The XML API complements the Java API as an ideal remote development environment.

Benefits

To Carriers

The strategy that has been described gives wireless carriers the ability to:

- Quickly build and deploy new services with minimal development effort and expense.

- Offer a variety of services, marketing either single applications or a bundled offering.

- Choose off-the-shelf, in-house, or third party applications—whichever is the best option based on internal resources, market conditions, and need for speed.

To Subscribers

Subscribers are able to choose from a variety of new services offered regularly by their carrier. These services bring them productivity, safety, and fun.

Summary

Wireless carriers and network operators interested in deploying wireless location services rapidly and with minimum effort have significant flexibility when choosing their application development strategy. They can choose:

- To deploy an off-the-shelf application suite to deliver location-based services to subscribers right away.

- To location-enable existing services with a rich service creation environment supported on a robust deployment platform.

- To obtain third-party applications, developed using the same service creation environment.

- To create new services in-house, using the same environment for rapid development.

The strategy described minimizes risk and resource expenditure for wireless carriers while providing maximum benefit and flexibility.

To get more information about Autodesk Location Services or to arrange an introductory meeting, send email to locationservices@autodesk.com or visit www.autodesk.com/locationservices.

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