Geoinformatics 2004
Proc. 12th Int. Conf. on Geoinformatics – Geospatial Information Research: Bridging the Pacific and Atlantic
University of Gävle, Sweden, 7-9 June 2004

OPEN LBS SOLUTION ARCHITECTURE USING SERVICE CHAINING WEBSERVICES TECHNOLOGY

Sang-Gi Hong, Kyong-Ho Kim and Jong-Hyun Park
LBS Research Team, ETRI, 161 Gajeong-dong, Yuseong-gu, Daejeon, 305-350, KOREA,
sghong@etri.re.kr, Tel: +82-42-860-1795

Abstract

The development of an open LBS platform makes it easy to use of the location information between telecommunication companies which have different platforms and to develop various LBS solutions using position information. This paper proposes an open LBS solution architecture based on service chaining webservices technology.

INTRODUCTION

LBSs (Location Based Services)-which are kinds of mobile services tracking the position of mobile devices such as mobile phone and PDA, and providing solution contents connected with the location - are emerging killer applications in the mobile communication networks. There have been already a lot of LBS applications in the market. But, due to the variable techniques and different platform systems, new issues are raised in the application development, such as scalability, heterogeneity and adaptability. To overcome such problems, Open LBS projects and studies have been started (Jose et al., 2001).

Here we introduce a solution architecture, which is based on the open platform. This paper proposes an open solution architecture to support the open LBS platform and service chaining webservice technologies and we make a prototype system, L-transport solution system.

The outline of the paper is as follows: The second section describes the architecture of open LBS and its subsystem. Then, in third section, we describe the service chaining solution and prototype system, L-transport, and the last section we summarize our research.

SYSTEM ARCHITECTURE

Open LBS technology is promising technology to supply open services on complex distributed networks and consists of position determination technology, open LBS platform technology, open LBS core common technology and open LBS solution technology (Figure 1).

The position determination technology can be categorized according to the coverage area as outdoor positioning and indoor positioning. Outdoor positioning plays key role in the most application areas. Some of the representative technologies are Cell-ID, E-OTD (Enhanced Observed Time Difference), E-FLT (Enhanced Forward Link Triangulation), and A-GPS (Assisted GPS). There are differences in the positioning accuracy and response time among these technologies so the application should be determined regarding these quality-of-service factors of each technology.

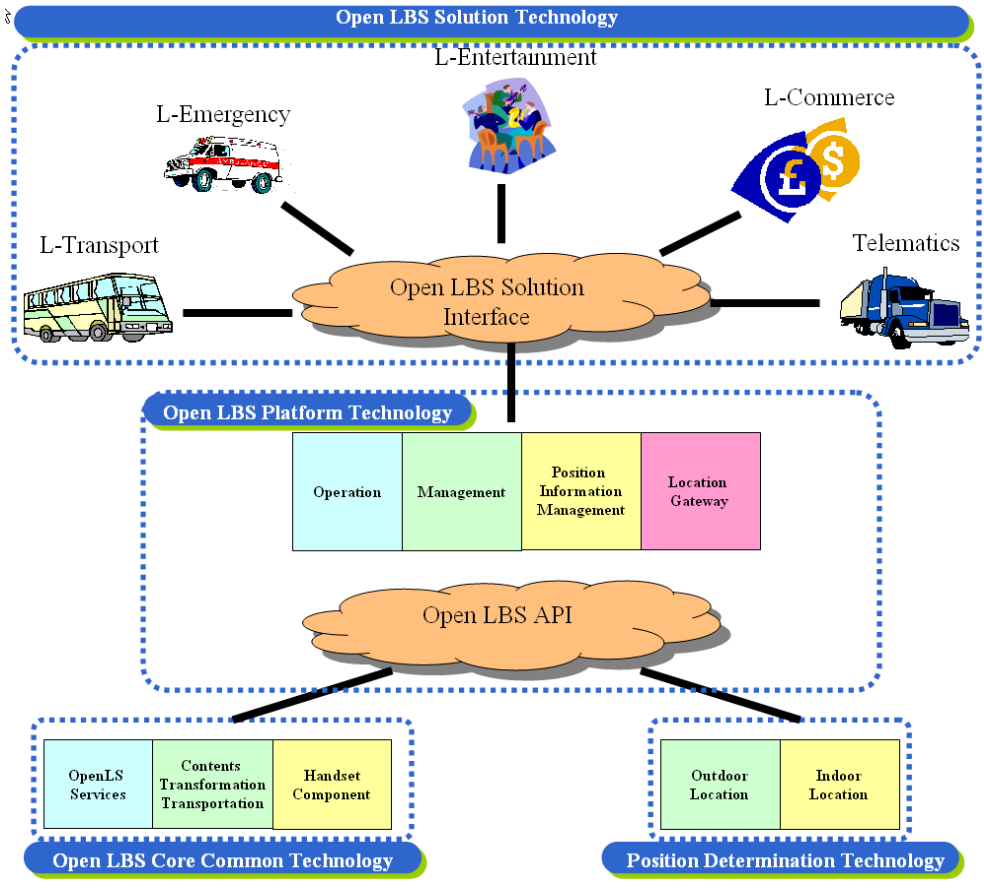


Figure 1: System Architecture of Open LBS.

The indoor positioning technology is paid more attention today due to its applicability in ubiquitous computing area. This technology utilizes usually the infrared, radio frequency, ultrasonic wave, and vision system.

The open LBS platform technology is the server technology acquiring and managing position-related information. The key role of this platform is to handle the huge size of position data fast, efficiently, and reliably. For this purposes the special database technologies such as moving object database and main memory database are utilized.

The core common technology is to provide the common and essential functionality for various kinds of location services. The core technology is composed of the LBS-based component technology, contents transformation and transmission technology, and handset component technology. These technologies are also based on several elementary technologies respectively.

The open solution technology is a technology to create services such as L-transport information, L-emergency service, telematics and etc, using position information and core common component as webservices.

SERVICE-CHAINING L-TRANSPORT SOLUTION

Variable application services can be developed and provided to the service providers through base technologies described in the LBS System.

Here we suggest a new solution architecture which can be referred to as *service chaining*, the process of combining or pipelining results from several complementary services (location gathering services and openLS common services and other solution services) to create customized larger services (Alameh, 2003). To make service chaining solution, we use webservice technology that is a web of software building block that is available on a network from which programmers can efficiently create large-scale distributed system and that consists of SOAP, WSDL and UDDI. To test efficiency of proposed architecture we developed L-transport solution service, like Figure 2 below.

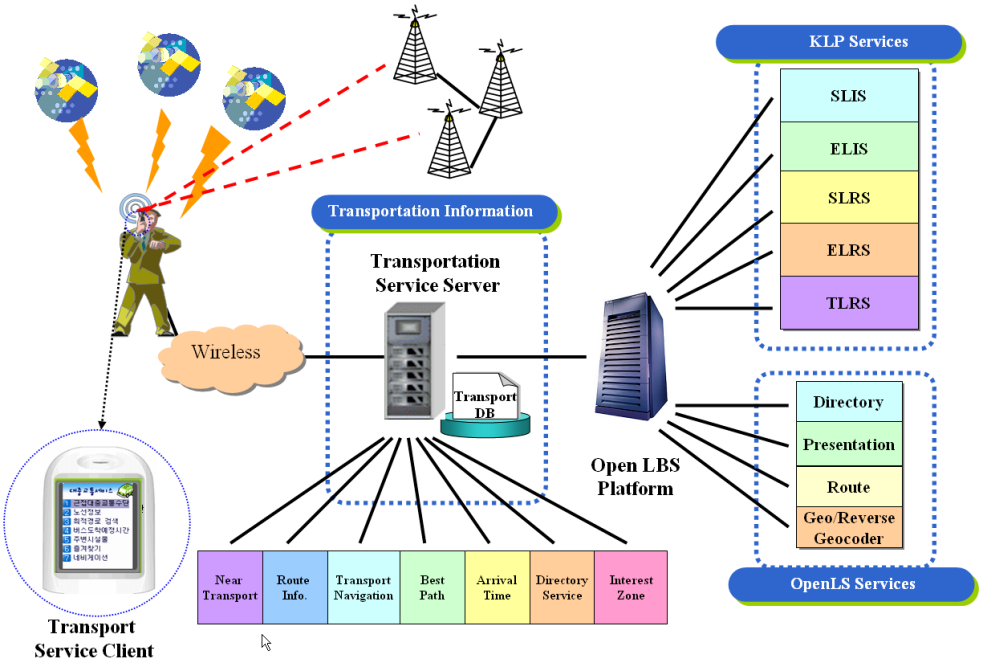


Figure 2: L-transport Solution Service.

L-transport solution

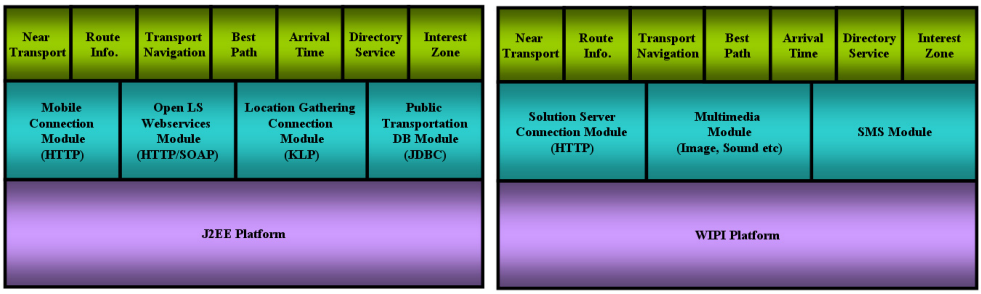
L-transport solution works together open LBS platform which providing location information and OpenLS webservice and it consists of solution server and client.

The function of the solution server is providing L-transport services requested by a client using LBS platform and public transportation database. The structure is like Figure 3a.

The solution server, based on J2EE (Java Enterprise Edition) platform, has several sub modules such as solution client connection module, OpenLS webservices module, KLP connection module and public transportation DB module. The solution connection module is a HTTP communication module between server and client. The function of KLP connection module is getting a location of mobile phone as standard protocol. OpenLS

Webservices module communicates with platform over the HTTP/SOAP and gets the Open LS services from the platform. At last, public transportation DB is accessed via the transport DB module. Using above modules, L-transport services are created for the client

Figure 3b shows the structure of the solution client that displays public transportation contents as explained in Table 1, to the service subscribers.



(a) L-transport server (b) L-transport Client

Figure 3: L-transport Server and Client Structures.

Table 1: L-transport Services.

Service	Function
Near Transport	Find bus stops or subway station near the user's location
Route Info.	Display the buses and train stops at the selected stop and station, and show route information of multi-modal transports
Transport Navigation	Notify at the stops when the user move on the bus to the destination stop
Best Path	Find best path from start to destination and multi-modal transport along the path
Arrival Time	Show the estimated arrival time of bus at the selected bus stop
Directory Service	Search a facilities and Show the map around that facilities
Interest Zone	Provide one-click service by bookmarking the path or destination or service which users are interested in.

The solution client, based on WIPI platform, consists of solution server connection module for communicating with solution server over HTTP, multimedia module for multimedia data processing and SMS module.

WIPI is a standard mobile platform standardized by the KWISF (Korea Wireless Internet Standardization Forum) received requirements from Korea mobile telecommunication companies and it is embedded into mobile phone to execute mobile application programs. The solution client selects the WIPI platform and programs with Jlet to be compatible with various telecommunication companies and provides public transportation contents to the service subscribers.

Service chaining webservice

To develop L-transport solution, service chaining model like Figure 4 is used. The figure shows one of the L-transport services, best path service, which includes *KLP service* to get a location of client (KLSF, 2003), *directory service* to search a destination (OGC 02-94, 2002), *presentation service* to display a map of interesting area (OGC 02-91, 2002) and *public transport route service* to provide clients with multi modal best path. And last, the map from *presentation service* and path from *public transport route service* are overlaid and displayed to the clients. In Figure 4, each service is developed as webservice and it can be used as component service to make another services.

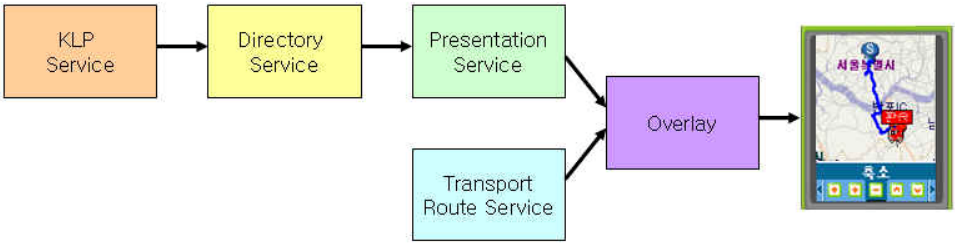


Figure 4: L-transport Service Chaining Example (Best Path Service).

CONCLUSION

In this paper, we suggest an open webservice solution working together open LBS platform. It uses service chaining webservice technology to make open solution. The proposed architecture provides open interface between other solution services, improves the reusability of service components included in the each solution, makes it easy to integrate and extend the components and finally it will play an important role in the proliferation of location services market and industry.

REFERENCES

Alameh, N., 2003: Chaining geographic information web services. *IEEE Internet Computing*.

Jose, R., Moreira, A., Meneses F. and Coulson, G., 2001: An open architecture for developing mobile location-based applications over the internet. *IEEE Proc., Sixth Symposium on Computers and Communications*.

KLSF, 2003: *LBS Platform Stage2: KLP (Korea Location Protocol Version 1.0.0).*

OGC 02-91, 2002: *OpenLS Presentation Service*

OGC 02-94, 2002: *OpenLS Directory Service Specification*