LBS Standards & Technology Trends in Korea

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Contents

- International LBS Standardization Activities
  - 3GPP
  - OGC
  - LIF
  - ISO/ANSI
- LBS Standardization Activities In Korea
- LBS Technology Trends In Korea

International LBS Standard Organization

- 3GPP (3rd Generation Partnership Project)
  - Globally applicable technical specifications and technical reports for a 3rd Generation Mobile System based on evolved GSM
- OGC (Open GIS Consortium)
  - Interoperability for technologies involving spatial information and location
  - OpenGIS specifications and Interoperability initiatives
- LIF(Location Interoperability Forum)
  - both network protocol and positioning technology independent with the goal of addressing interoperability issues and accelerating time to market of location-based services
- ISO(International Standard Organization)
  - the development of standardization and related activities to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of scientific, technological and economic activity

3

3GPP - LCS Stage 1

- Objectives
  - Overall service description from the service subscriber's and user's points of view
  - Applicable information to network operators, service providers, terminal/base station system/switch/database manufacturers
- Contents
  - Functional requirements
  - Logical description
  - Service provision
  - Provisioning and administration
  - QoS of LBS
  - Annex A : USA FCC Wireless E911 Rules
  - Annex B : Descriptions of possible location based services

4

OGC - OpenLS

- Objectives
  - Open specifications for interoperable location application services
- OpenLS Testbed Phase I(Aug.2001-Feb.2002)
  - Interface specifications in support of interoperable location services through mobile terminals
  - Gateway services that integrate OpenLS location application services with position determination equipment in the MPC/GMLC
  - Directory services for searching yellow pages, green pages, travel guides, and so on
  - Route determination services for navigation
  - Location utility services
  - Presentation services
  - Geocode and reverse geocode services

5

LIF - MLP

- Objectives
  - Application-level protocol for querying the position of mobile stations independent of network technology
  - Interface between a Location server and a application
- LIF TS 101 v2.0.0(Nov.2001)
  - MLP Structure
    - Transport layer : defines how XML content is transported
    - Element layer : defines all common elements used by the services in the service layer
    - Service layer : defines the actual services offered by the MLP framework
  - Contents
    - Mobile Location Service Definitions
    - Elements and attributes in DTD
    - Result codes and error codes

6

ANSI 41-E911 Phase 2(J-STD-036)

- Objectives
  - Define the messaging required to support information transfer to identify and locate wireless emergency services callers
  - Provide a solution for the handling of Wireless Enhanced Emergency Calls
- Contents
  - Stage 1 Emergency Services Service Descriptions
  - Functional Overview, ANSI-41
  - Stage 2 Emergency Services Network Description, ANSI-41.3
  - Functional Overview, PCS1900
  - Stage 3 Implementation Perspective : Emergency Services Protocol(ESP)
  - Stage 3 Implementation Perspective : ANSI-41.5 Enhancement Location Services Protocol(LSP)

7

Standards(1)

기관	문서번호	제 목	기타
OGC	Initiative	RFT for OpenLS Testbed	Ref.
LIF	TD201	The challenge with inter-operability in LCS	Tech.
	TS101	Mobile Location Protocol	
	TS202	Location Services (LCS) Inter-operability Test (IOT) specification in GSM	
ISO/ TC211	P19132	Location based services possible standards	
	P19133	Location based services tracking and navigation	
	P19134	Multimodal location based services for routing and navigation	

8

Standards(2)

기관	문서번호	제 목	기타
3GPP	TS22.071	Location Services (LCS); Stage 1	Rel 6
	TS23.271	Functional stage 2 description of location services	Rel 6
	TR23.871	Enhanced support for user privacy in Location Services	Rel 5
	TS24.030	Location Services; Supplementary service operations; Stage 3	Rel 5
	TR29.998 -06	Open Service Access (OSA) Application Programming Interface (API) Mapping for Open Service Access; Part 6: User Location and User Status Service Mapping to MAP	Rel 5
	TS43.059	Functional stage 2 description of Location Services in GERAN	Rel 5
	TS44.031	Location Services ; Mobile Station (MS) - Serving Mobile Location Centre (SMLC) Radio Resource LCS Protocol (RRLP)	Rel 5

9

Standards(3)

기관	문서번호	제 목	기타
3GPP	TS49.031	Location Services ; Base Station System Application Part LCS Extension (BSSAP-LE)	Rel 5
	TS44.071	Location Services ; Mobile radio interface layer 3 LCS specification	Rel 4
	TS48.031	Location Services : Serving Mobile Location Centre - Serving Mobile Location Centre (SMLC - SMLC); SMLCPP specification	Rel 4
	TS48.071	Location Services ; Serving Mobile Location Centre - Base Station System (SMLC-BSS) interface; Layer 3 specification	Rel 4

10

Contents

- International LBS Standardization Activities
- LBS Standardization Activities in Korea
  - Location Based Service Committee
  - Roles & Participants
  - Device & Application Service WG
  - LBS Platform WG
  - Common Based Tech. WG
- LBS Technology Trends In Korea

Location Based Service Committee

- Objectives
  - Provide technical standards related with LBS
  - Cope with related International standards organizations or forums
  - Develop Korea technical specification related with LBS
  - Create and Activate LBS market
- Organization
  - Wireless Positioning WG
  - Device & Application Service WG
  - LBS Platform WG
  - Common Based Technology WG
  - Emergency SIG
  - Expert Committee

Location Based Service Committee

WG	Role	References	Participants
Wireless Positioning Tech WG	•Device-based Wireless Positioning Tech/Standard development •Network-based Wireless Positioning tech/Standard development •GMLC/MPC Tech/Standard development •QoS-based Positioning Interface Standard development	3GPP /3GPP2	**NaviCom,** SamsungElectronic, SSangYong, KTF, SKT
Common Base Tech WG	•Vast-Volume Position Data Processing & Saving Tech Development •Moving-Object Database Tech development •Map Service Tech/Standard development •Directory Service Tech/Standard development	3GPP /3GPP2 OpenLS	**SICC**, GeoTel, HIST, Multics
LBS Platform WG	•Platform Composition & Interface Standard development •Platform Base Tech development (Application Server) •Standard API Protocol Standard development(XML) •GMLC/MPC Interface Standard development	3GPP /3GPP2 LIF OpenLS	**GaeaSoft,** Point-I, KTdata, KTIT
Device & Application Service WG	•Common API Function Standard development for App. Service •Position accuracy demand Standard development by App. Service •LCS Client Tech/Standard development by Platform •Pull/Push Service Tech/Standard development	3GPP /3GPP2 OpenLS LIF	**Point-I,** KTICOM, SamsungSDS, KTF, SKT
Emergency Rescue SIG	•Public Safety Service Tech/Standard development	ANSI FCC E911	**Neighborsystem,** Point-I, KTdata

13

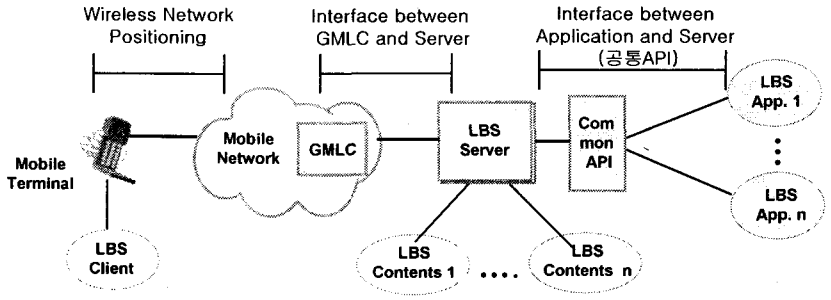
Device & App. Service WG - Plan

- Phase I
  - May.2002~Sep.2002
  - Editors : Point-I, Neighbor system, Ktdata, Kticom, SamsungSDS, GeoNSpace
  - Location based application service functional specification
    - Standardization Scope Definition
    - Functional Requirements & QOS
- Phase II
  - Oct. 2002~Aug.2003
  - Location based application service implementation specification
    - Common API with XML
    - LBS Service Implementation Spec. (Emergency, Tracking, Directory, Navigation, Push Service)
    - API Level Specification

14

Device & App. Service WG – Phase I(1)

- Standardization Scope
  - Location based application service
    - Public safety service : Emergency service, Emergency alert service
    - Tracking service : Feet Mgt, Asset Mgt, Personal Tracking
    - Navigation service
    - Yellow Pages service
    - Push service



Device & App. Service WG – Phase I(2)

- Function definition and Requirements
  - Open Standards
    - Conceptual model and architecture of 3GPP TS 22.071, TS 23.271
    - Interoperability with foreign standards(3GPP/3GPP2, LIF, OGC, etc.)
  - Flexibility and Extensibility in UE and Positioning technical environment
  - Priority, reliability, accuracy
  - LBS server
    - Wireless network connection, LBS client & application support, location processing, privacy protection, etc.
  - Service connection request & response function
  - Location information request & response function
  - Map information request & response function
  - Information type support requirement

Device & App. Service WG – QoS Definition

service	authorization	privacy	notification	horizontal accuracy	Vertical accuracy	Response time	Period of report	registration	activation	de-activation	invocation
Emergency	Not Req'd	Provide info. To safety org	Not Req'd	Network 100m(67%) 300m(95%) Handset 50m(67%) 150m(95%)	N/A (5m-15m future	5sec. (AGPS-15sec)	1-10min.	Not Req'd	Not Req'd	Not Allowed	119 dialing
Emergency Alert	Req'd	Provide info. To SP	Not Req'd	125m	N/A (5m-15m future	5sec. (AGPS-15sec	1-10min.	Req'd	Operator	Operator	Auto
Fleet Mgment	Req'd	Provide info. To SP	Not Req'd	125m -Cell ID	N/A	5sec. (AGPS-15sec	1-10min.	Req'd	Operator	Operator	Menu or operator
Asset Mgment	Req'd	Provide info. To SP	Not Req'd	10m-125m	N/A (5m-15m future)	5sec. (AGPS-15sec	1-10min.	Req'd	Operator	Operator	Menu or operator
Person Tracking	Req'd	Provide info. To SP	Req'd	10m-125m	N/A (5m-15m future	5sec. (AGPS-15sec	1-10min.	Req'd	Operator	Operator	Menu or operator
Navigation	Req'd	Provide info. To SP	Req'd	10m-50m	N/A	5sec. (AGPS-15sec	1-10min.	Req'd	Menu or operator	Menu or operator	Menu
Yellow Page	Req'd	Provide info. To SP	Not Req'd	125m -Cell ID	N/A	5sec. (AGPS-15sec.)	Not Req'd	Req'd	Menu or operator	Menu or operator	Menu
Push	Req'd	Provide info. To SP	Not Req'd	125m -Cell ID	N/A	5sec. (AGPS-15sec.)	1-10min.	Req'd	Menu or operator	Menu or operator	Auto or operator

17

LBS Platform WG - Plan

- Phase I
  - May.2002~Sep.2002
  - Editors : Gaeasoft, Point-I, Ktdata
  - Location based service platform functional specification
    - Standardization Scope Definition
    - Functional Requirements
- Phase II
  - Oct.2002~Aug.2003
  - Location based service platform implementation specification
    - API Level Implementation specification

18

LBS Platform WG – Phase I

- Standardization Scope
  - Location Request & Response
  - Location Managing
  - Location Based Functions
  - Profile Management
  - Authentication & Security
  - Information Roaming between Carriers
- Functional Requirements
  - There is between location application server and positioning system of Wireless Internet Network
  - Function : location request & Mgment, profiling, user authentification, information transmission between carriers
  - Provide Interface Independent with Wireless Internet Network
  - Provide Information Infra independent with positioning method
  - Provide added functions for LBS

19

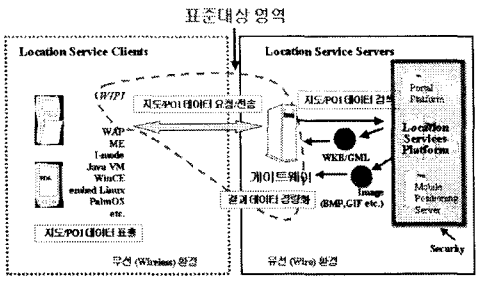
Common Based Tech WG - Plan

- Phase I
  - May.2002~Dec.2002
  - Editors : SICC, Geotel, HIST, Multics Etc.
  - Map & POI service functional specification for Mobile phone
    - Standardization Scope Definition
    - Functional Requirements
- Phase II
  - Jan.2003~Aug.2003
  - Map & POI service implementation specification for Mobile phone
    - API level implementation specification

20

Common Based Tech WG – Phase I

- Standardization Scope
  - Map & POI Request & Transmission
  - Map & POI Presentation
  - Legacy GIS Data Service Interface



- Functional Requirements
  - Acceptance of Open Standards
  - Map & POI Presentation function must reference WIPI specification
  - Map & POI Request Parameter Transmission
  - Acceptance of limited Wireless Internet Network environment
  - Maintenance of Interoperability with LBS Platform WG specification in Gateway system Interface

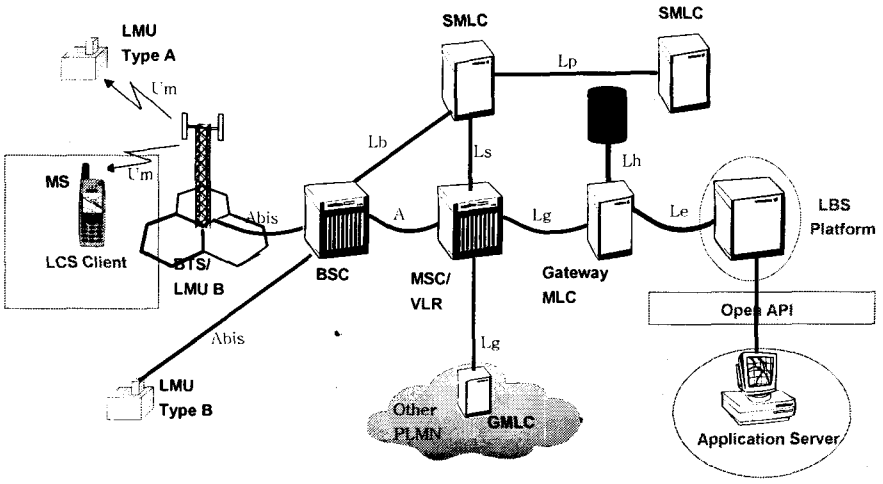
21

Contents

- International LBS Standardization Activities
- LBS Standardization Activities In Korea
- LBS Technology Trends In Korea
  - LBS Network Structure
  - LBS Technology Field
  - LBS Platform Reference System
  - Common API based on XML
  - LBS Data Transmission
  - Moving Object & Spatial MMDBMS
  - LBS Service & Platform Feature
  - LBS Road Map

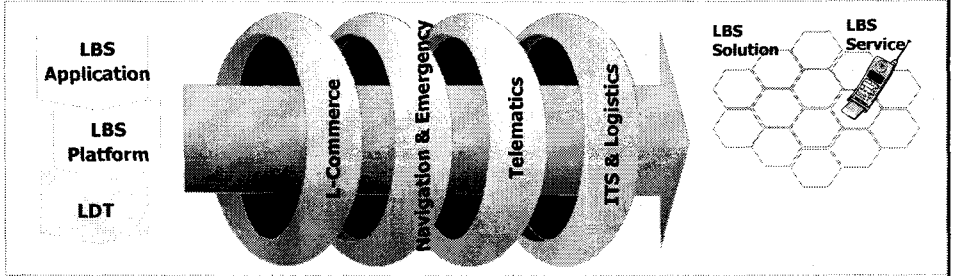
22

LBS Network Structure



LBS Technology Field

Platform & S/W			Contents, Application & Service				Mobile Network & Device			Market
Technology platform vendors	Infra & equipment vendors	LBS S/W Solutions	Mobile Portal providers	Content providers	SERVICE PROVIDER (Business/ Public)	Service Provider (B-to-C)	Mobile network operators	LDT Tech.	Handset vendors	Customer
• Microsoft • Phone.Com • KVM • BREW • WIPI	• LG • Samsung • Lucent	• POINT-I • GaeaSoft	• Portal • Telco	• Map • YP • traffic • Commerce	• SK Entrac • Samsung Fire • S1 • E119	• POINT-I • AMI • Thinkware	• SKT • KTF • LGT • KTICOM	• Cell ID • AGPS • Network	• LG • Samsung • HyunDai	



LBS Platform Reference System

- Suitable for 2, 3G(IMT-2000) Services
- Features
  - Network Interface
    - GMLC Interface
  - User Identification & Personal Information Security
    - Identification & Authentification
    - Profile Management
  - System Operation & Management
    - Load Balancing, Tolerance, Backup
    - Billing
  - Location Info Management
    - Trace, Tracking, Trigger, Proximity
  - Spatial Data Processing
    - Saving, Updating, Indexing

25

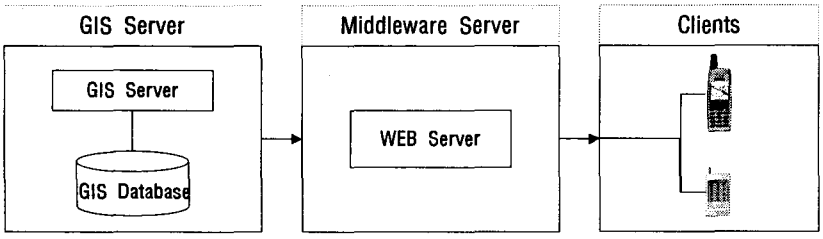
Open Common API based on XML

- Common API based on XML for Contents/ Service Provider
- XML: Location Information & Contents
- Features
  - Common API based on XML for Location-based Application Services
    - API related with Subscriber Info, Location Info, and Contents
  - LBS Contents Aggregation
    - POI, Map, Traffic, Navigation Content Interface(XML API)
  - Contents Conversion
    - Map Image Conversion
  - LBS Data Processing for Mobile Devices

26

LBS Data Transmission

- LBS Data Transmission, and Display System for Wireless Internet using OGC standard
- Packet Compression & WKB(Well-Known Binary)
- Composition
  - Service Provider
    - OGC Simple feature type, Data Provider Component
  - Map Browser
    - WIPI Class Library & Transmitted Data Display



27

Moving Object DBMS

- Moving Object : Time and space attribute
- Data Modeling
  - Sequential model : infinite set of points
  - Separate model : finite set of points
- Query expression
  - Operator : mdistance, visits, trajectory, length, minvalue, maxvalue, mintime, maxtime, velocity, attime
- Indexing
  - TPR-tree, STR-tree, TB-tree
- Unreliability
  - Main factor : Measurement error and Sampling error
  - DOMINO Project, CHOROCHRONOS Consortium

28

Spatial MMDBMS

- MMDBMS
  - Manage a part of database or all on main memory
  - High processing speed through memory based query optimization
  - Direct access on memory
  - T-tree : Operation time and memory capacity minimization
  - Backup database on disk for recovery
- Spatial MMDBMS
  - Spatial data
    - multi-dimension type : point, line, polygon
    - Abnormal : variable data type
    - Vase volume : variable data size
  - Support spatial data type of OGIS
  - Spatial function
    - Basic, Relationship, Analysis, Construction,

29

LBS Services Feature

Issues / Service	Telematics	LBS Service	Needs LBS Platform	Needs Common API
Navigation	✓			✓
Safety & Security	✓	✓	✓	
Real-Time Re-routing(Push)	✓	✓	✓	
E-mail/Internet	✓			
Traffic Information	✓	✓		✓
People/Asset Tracking	✓	✓	✓	
Alert Service(Push)	✓	✓	✓	
Information (news, Weather,..)	✓			
Near by Information	✓	✓	✓	✓
Entertainment		✓		✓
Advertising(Push)	✓	✓	✓	
On-Line Research		✓		
L-Commerce		✓		✓
Value Added Services		✓		✓

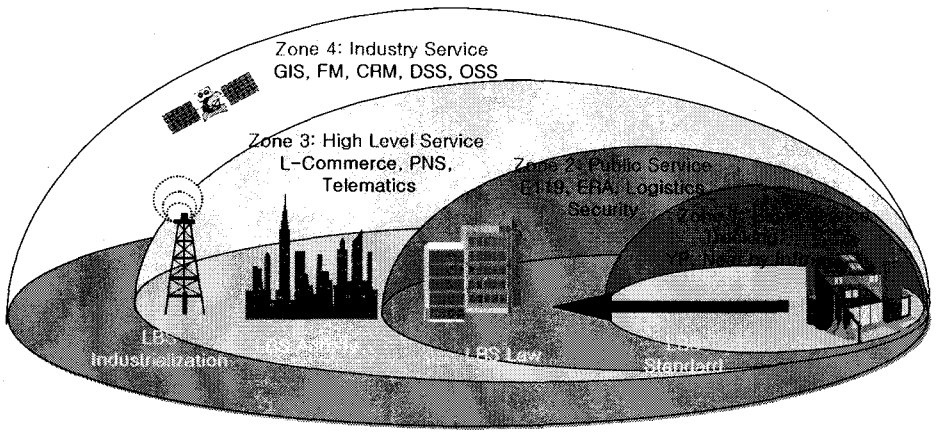
30

LBS Platform Feature

Functions \ Corp.		Point-I	Gravitate	SignalSoft	Pocket-it
LDT Support	Cell ID	○	○	○	○
	A-GPS	○	○	○	○
	Network	○	○	○	○
MPC Load Control		○	○	○	N/A
Spatial Indexing		○	×	×	×
MMDB		○	×	×	×
Location Retrieval		Excellent	Good	Medium	Good
Massive Volumes		○	○	N/A	N/A
Proximity		○	○	○	○
Tracking		○	○	○	○
Trigger		○	N/A	N/A	N/A
Push Enable		○	N/A	N/A	N/A
Profile/Privacy		○	○	N/A	○
Open API(XML)		○	○	×	×
Session Manager		○	○	○	○
Load Balancing		○	○	○	N/A
Fault Tolerance		○	N/A	○	N/A
Log Management		○	○	○	N/A
Map Provision		○	N/A	N/A	○
Multi Device		○	N/A	N/A	○
Standards		3GPP,LIF	N/A	N/A	N/A

31

LBS Road Map



32