

제1회 국제 LBS 기술 워크숍

The 1st International LBS Workshop

Opening Session

〈튜토리얼〉

LBS(Location-Based Services): Overview

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이 기 원 (한성대)



LBS (Location-Based Services): Overview

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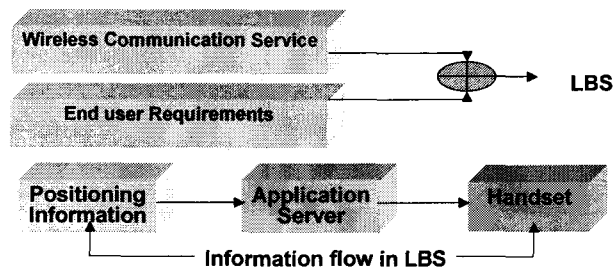


What is LBS ?

■ LBS

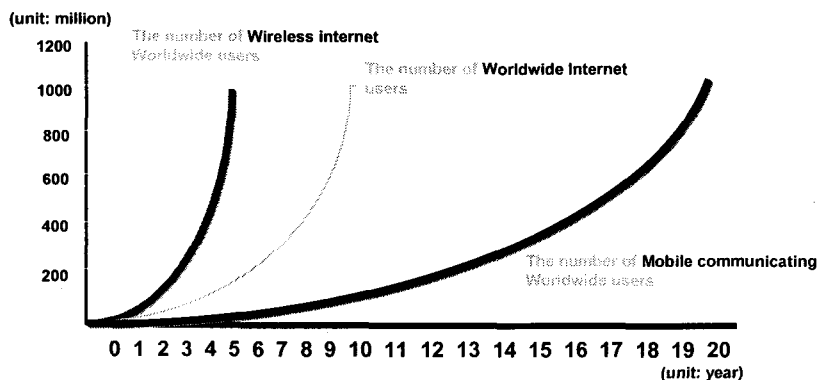
· Location Based Service(s)

- The ability to find the geographic location of the mobile device and provide specific information based on the location
- Real-time(Anytime) access of location(Where) information, and multi-platform S/W Services for these functionalities



Motivation of LBS

Exponential increasing wireless Internet users:
Needs Mobile location information

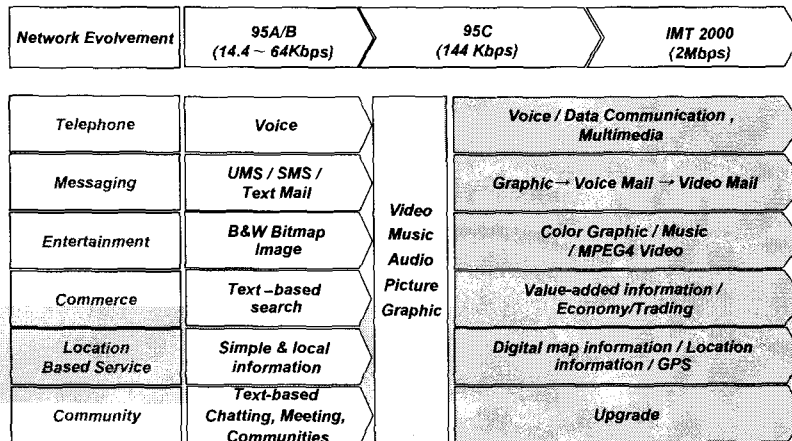


Source : BT Global Mobile Internet (July, 2000)





LBS in Mobile Network Infrastructure



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Why is there such an interest in LBS now ?

- *The penetration of interest enabled wireless devices*
- *The rollout of technologies that can position a wireless device accurately*
 - *Mobile phone Cell Identification, GPS, Mobile Network based triangulation(EOTD), AGPS et al ...*
- *The ability to use the position of the device and individual 'personal information' as a filter for high relevant offerings*
- *The regulatory forces driving carriers to accurately position wireless emergency calls*
 - *E911 in US, E112 in EU*
- *The pressure on mobile carriers to seek out new value added data services to increase and reduce churn*



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Prospects of LBS

- The Strategic Group predicts ... Market size of \$ 3.9 billion by 2004, in the US
- The Strategic Group predicts ... For the Asia-Pacific market, wireless internet user will reach 20 million users in 2000 to 216.3 million by 2007
- Allied Business Intelligence Inc. predicts ... \$ 1.0 billion in 2000 to over \$ 40 billion in 2006, showing annual growth rate of 81%
- Mobile wireless internet users in million ...

Region	2000	2005
North America	2	89
Europe	7	194
Latin America	0.1	52
Asia-Pacific	30	79
Worldwide	39	729

Region	2001	2003	2005
USA	12	96	217
Japan	12	68	110
Asia-Pacific	12	86	272
W. Europe	33	150	421
Total	72	432	1181

GeoWorld, April, 2002

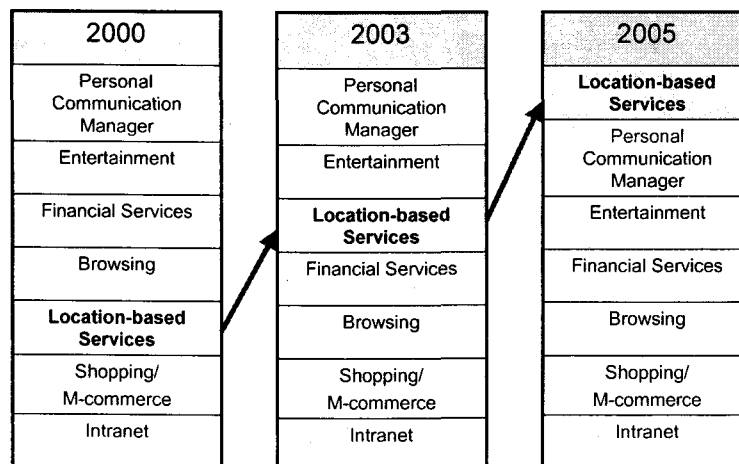
ARC Group, 2001



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Prediction of the Most Used Mobile Services



Geo-informatics, April, 2001



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Basis of LBS Functioning

- ***Accuracy***
 - *Error between actual location and measuring location*

- ***Range***
 - *Geographic coverage for sufficient services to communicating device users/holders*

- ***Legal Protecting individual information***
 - *Users information*

- ***Processing Performance***
 - *Network messaging request rate for service providing*



End User Requirements

	<i>Description</i>
<i>Personalisation</i>	<i>Relevance to individual's needs</i>
<i>Connectivity</i>	<i>Reliable wireless connection / coverage and Roaming</i>
<i>Positioning</i>	<i>Effective application based positioning accuracy</i> <i>- User defined accuracy</i>
<i>Security</i>	<i>Personal security</i> <i>- Privacy and ID</i> <i>Authentication Information security</i> <i>- Data encryption / integrity</i>
<i>Misc.</i>	<i>Intuitive interaction with different LBS applications on the wireless handset</i>



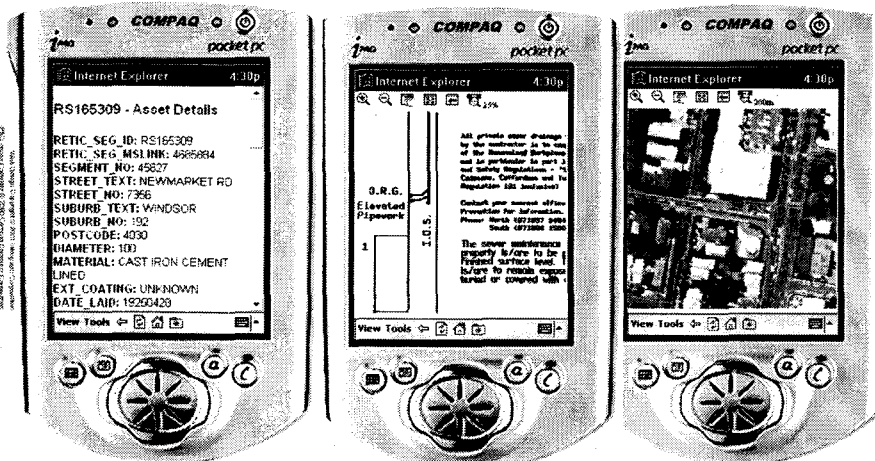
LBS market is just emerging ... driven by a number of key player

- **Mobile Operators must ...**
 - Attract new customers with improved services
 - Build demand for new data services and additional revenue streams
 - Increase subscriber loyalty to reduce churn
- **Application Providers want ...**
 - Short-time to market and low investment in product
 - Easy access to open functionality from operators' infrastructure
 - To deliver applications via many bearers at the same time (SMS, WAP, WEB ...)
- **Consumers only want ...**
 - Unique functionality they can't get elsewhere
 - Unique content they can't get elsewhere
 - Unbiased, comprehensive and accurate information
 - Costs that reflect the value proposition



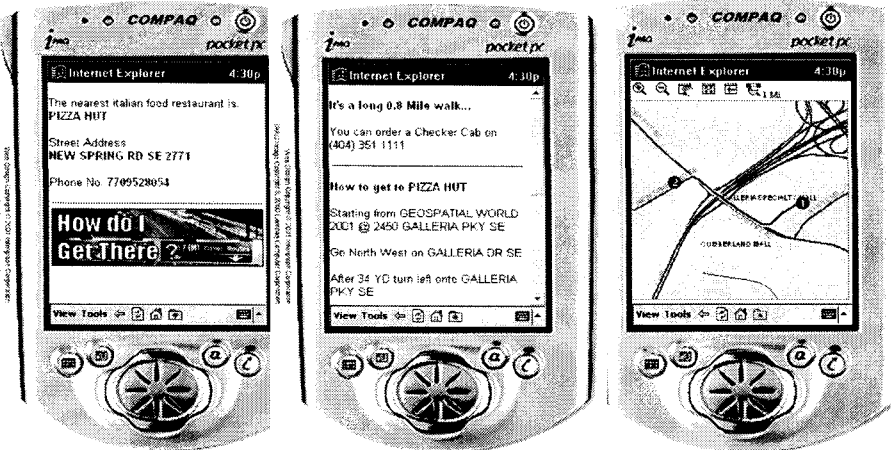
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Urban Facilities Management : Example: Where's Change ... ?



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Consumer Information Service: Example: Where's My Nearest ... ?



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LBS Deployment

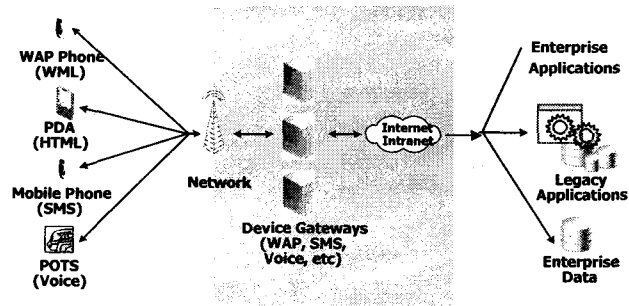
- **LBS Industry**
 - Collection of services offered by a value of chain of inter-connected IT companies and contents provider
- **LBS Community**
 - LDT (Location Determination Technology)
 - Geo-spatial and content implementation technology
 - Multiple data transport protocol
- **The key to navigating this location interoperability landscape**
 - Ubiquitous set of inter-connected wireless communications and internet location services standards



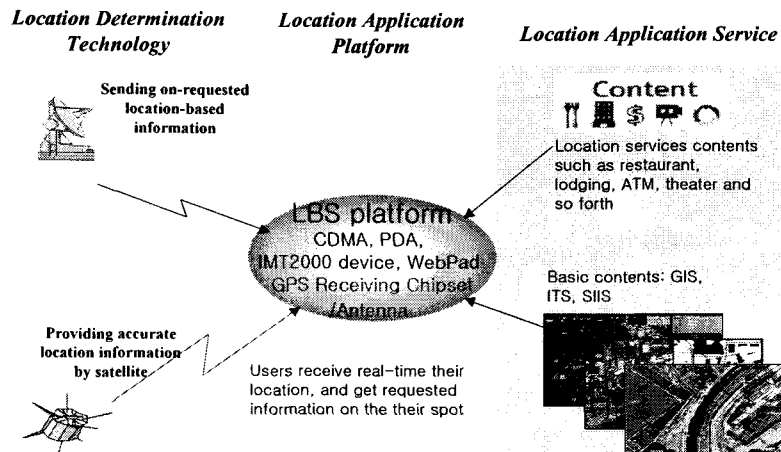
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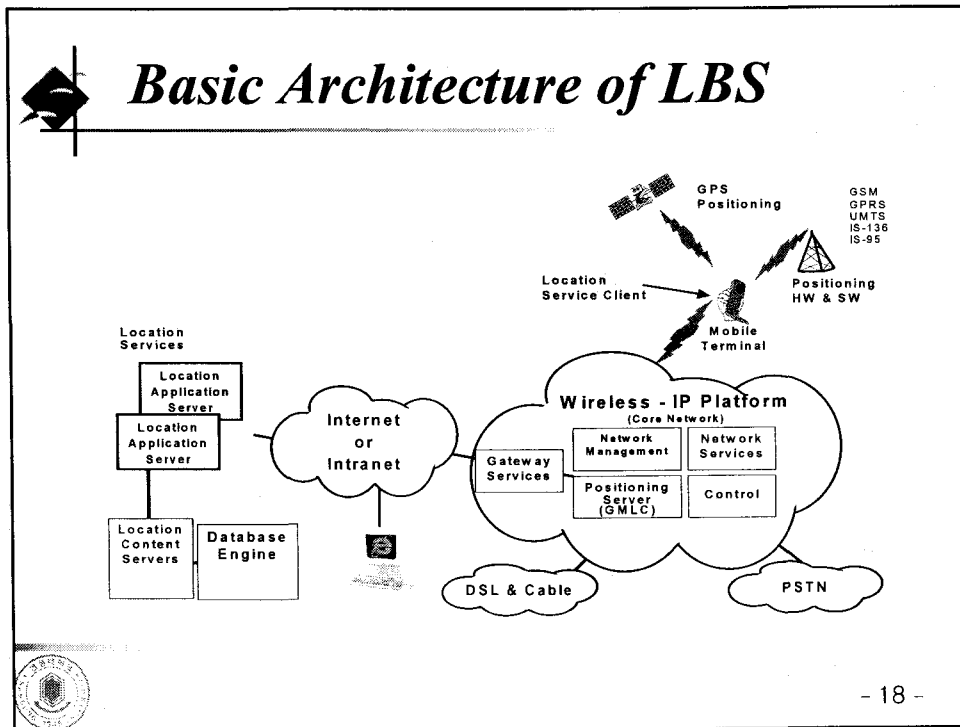
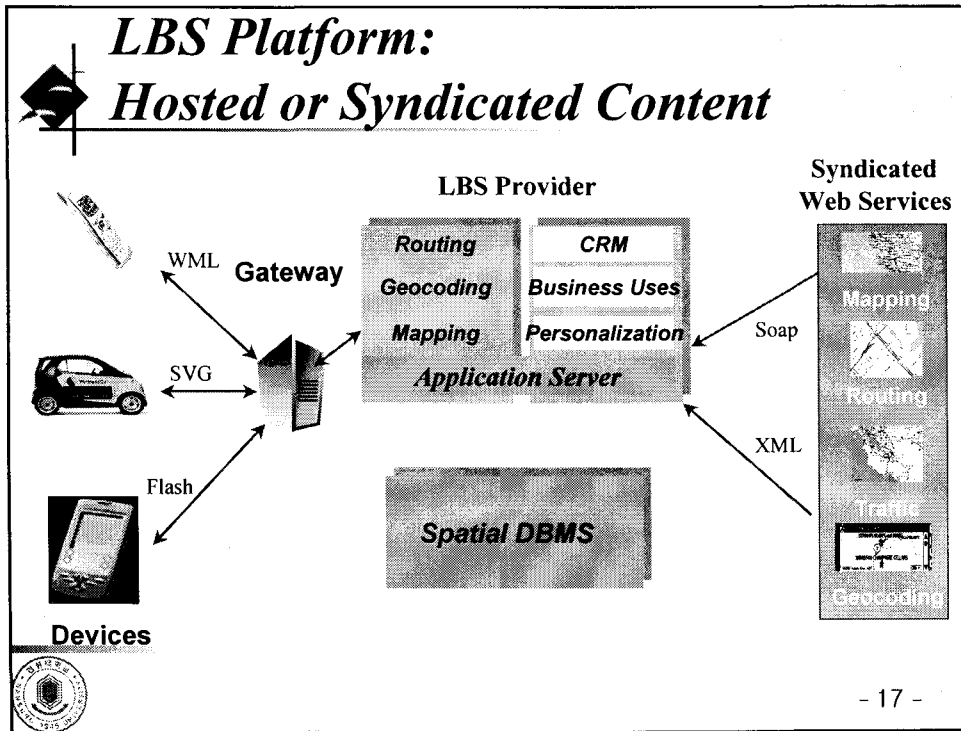


General Wireless Architecture

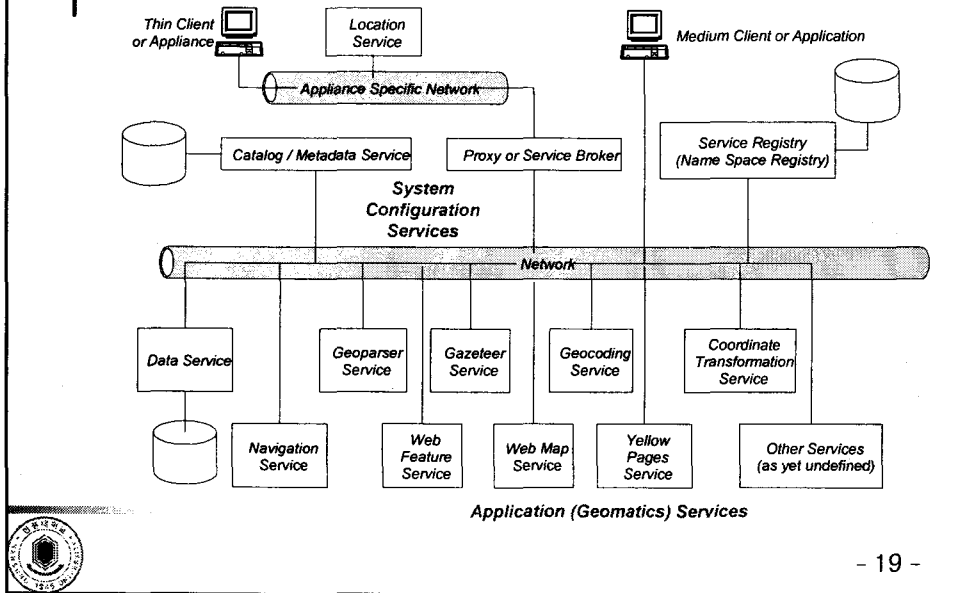


Technology Components for LBS





Conceptual Architecture of LBS by ISO

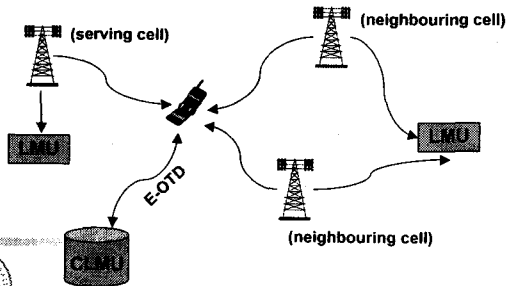
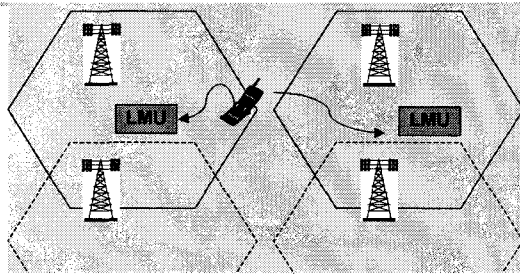


LDT Technologies

TOA, AOA & TDOA Systems

LMU : Measures time of the signal's arrival

Triangulation Technique : Measuring angle/time of arrival/time difference of signals



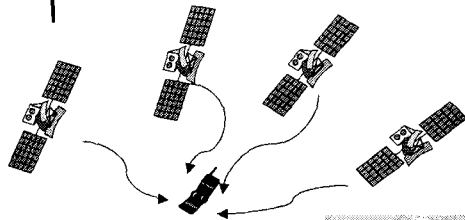
E-OTD System

CLMU : Hold a repository of LMU measurements (a database in principle)



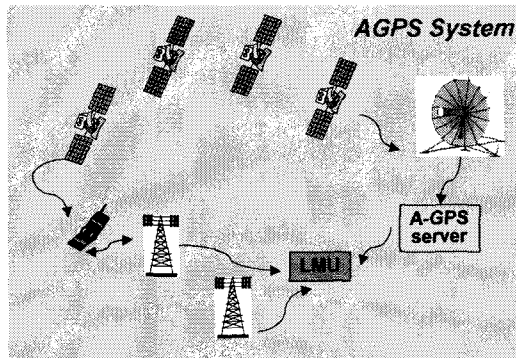


Global Positioning System (GPS)



GPS receiver measures distance to GPS satellites
Distance measurement to at least 4 satellites to compute 3 dimensional co-ordinates
The 4th satellite reading is used to estimate the time correction for the receiver's internal clock

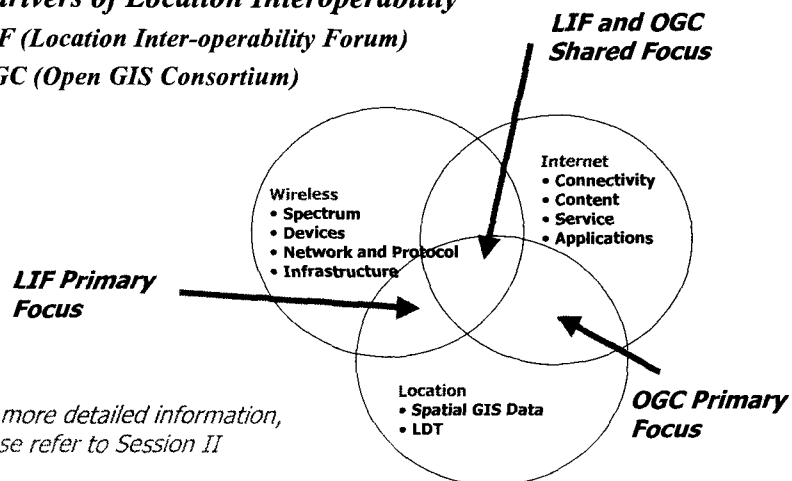
Note: For more detailed information, Please refer to Session III



Location-specific Standards for LBS

Two drivers of Location Interoperability

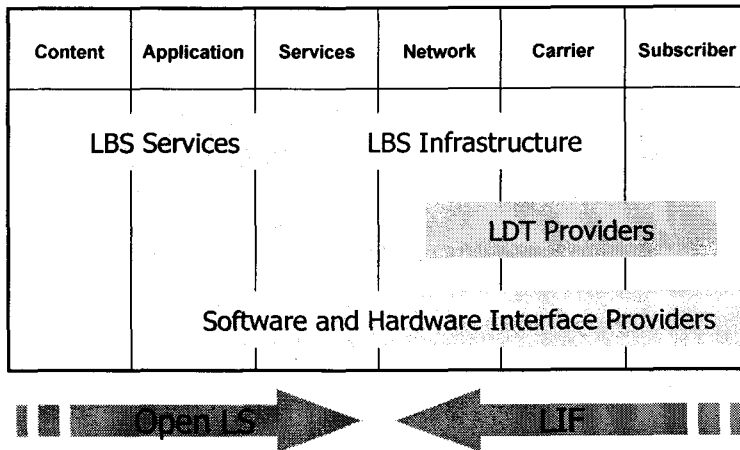
- LIF (Location Inter-operability Forum)
- OGC (Open GIS Consortium)



Note: For more detailed information, Please refer to Session II

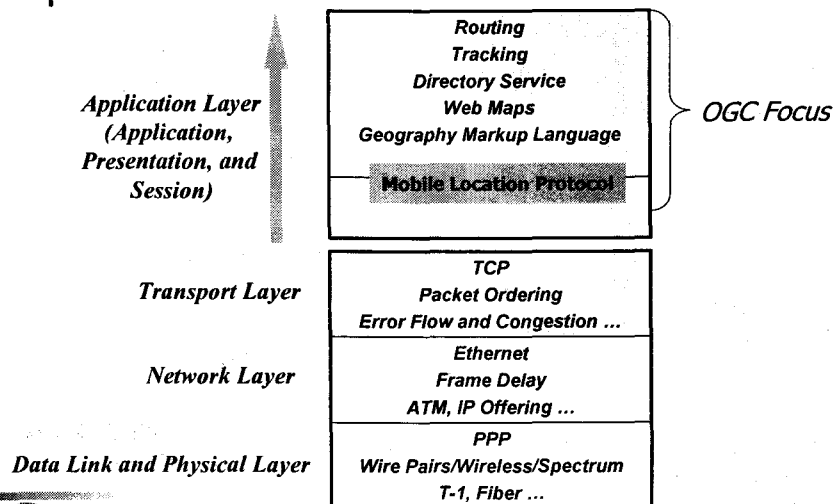


Wireless Location Interoperability Challenge

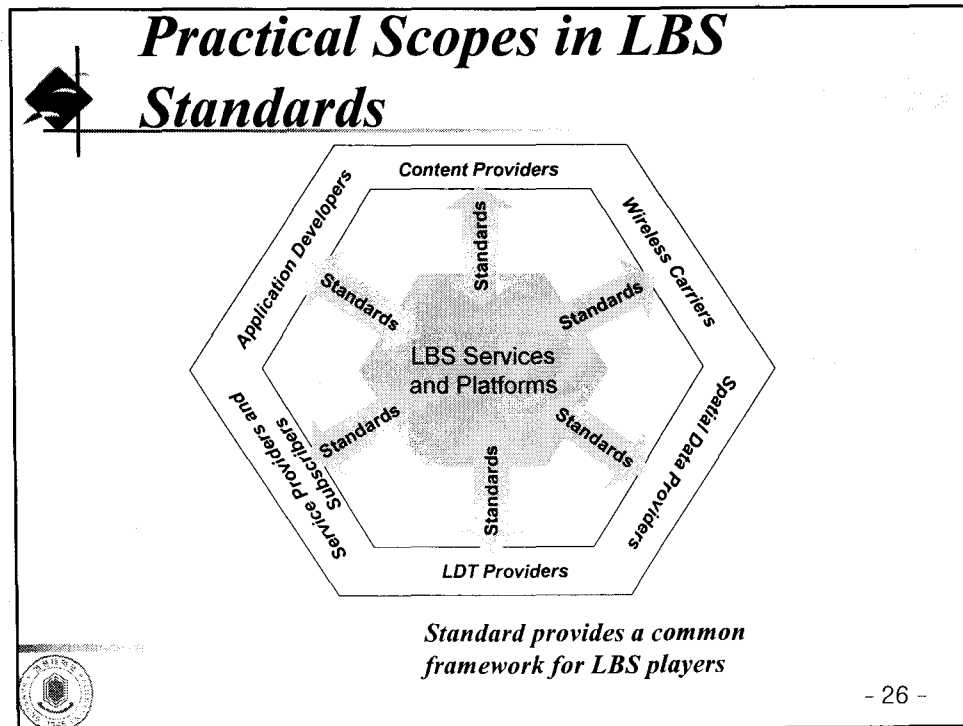
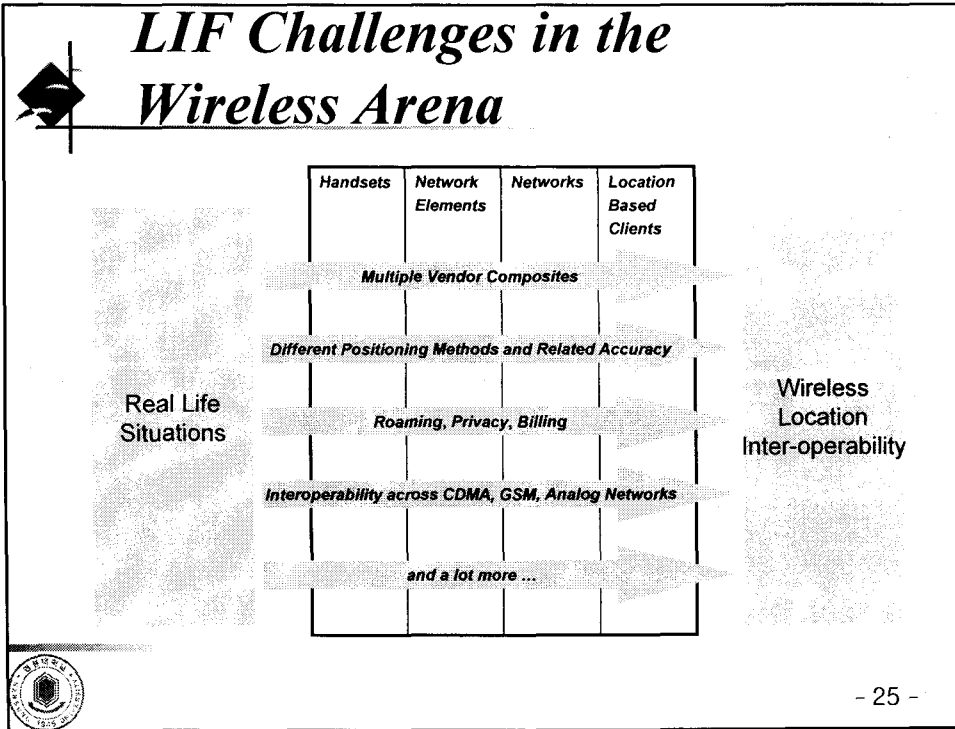


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OGC Activities for Internet Interoperability



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Technology Components for LBS

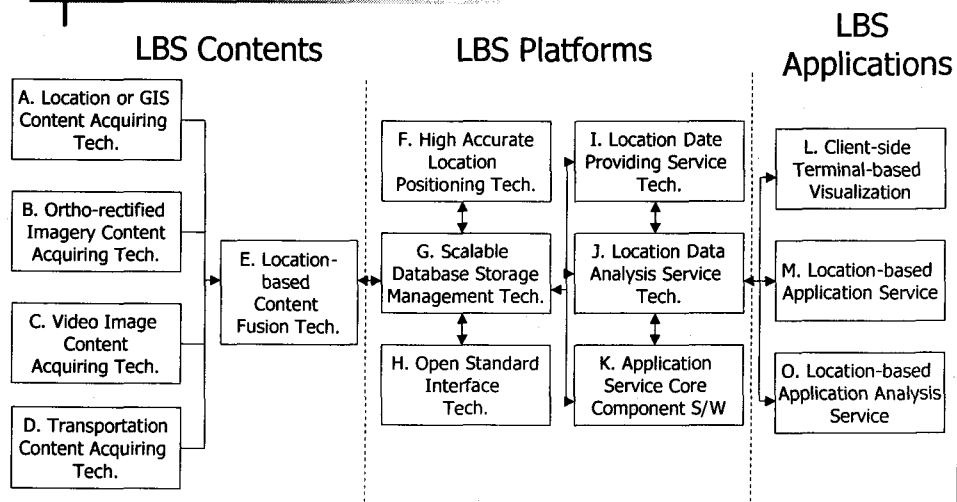
- **Location Determination Technology**
 - Wireless Sending/Receiving technology
 - Handset-based GPS
 - Network-based AOA, TOA, TDOA
- **Location Application Platform**
 - Platform technology for various types of LBS Applications by using Location Search or Tracking Technology
 - Spatial Information processing for Vector and Image type data
- **Location Application Service**
 - Applications Service-oriented by Location Searching, Tracking, Processing Technology
 - Location recognition and tracking service, Emergency service



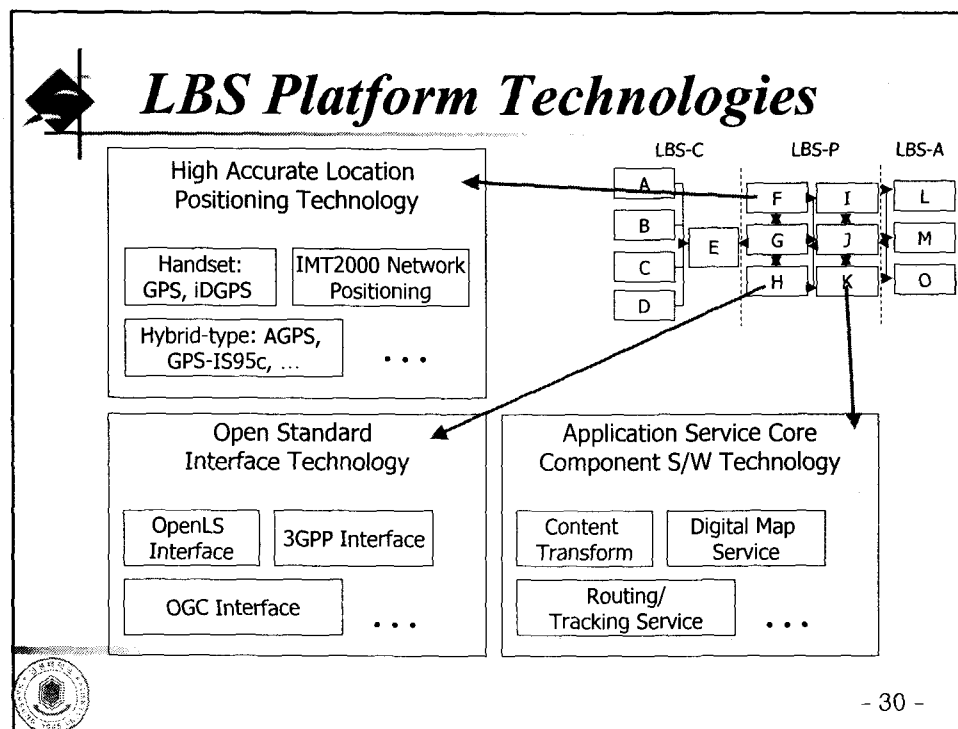
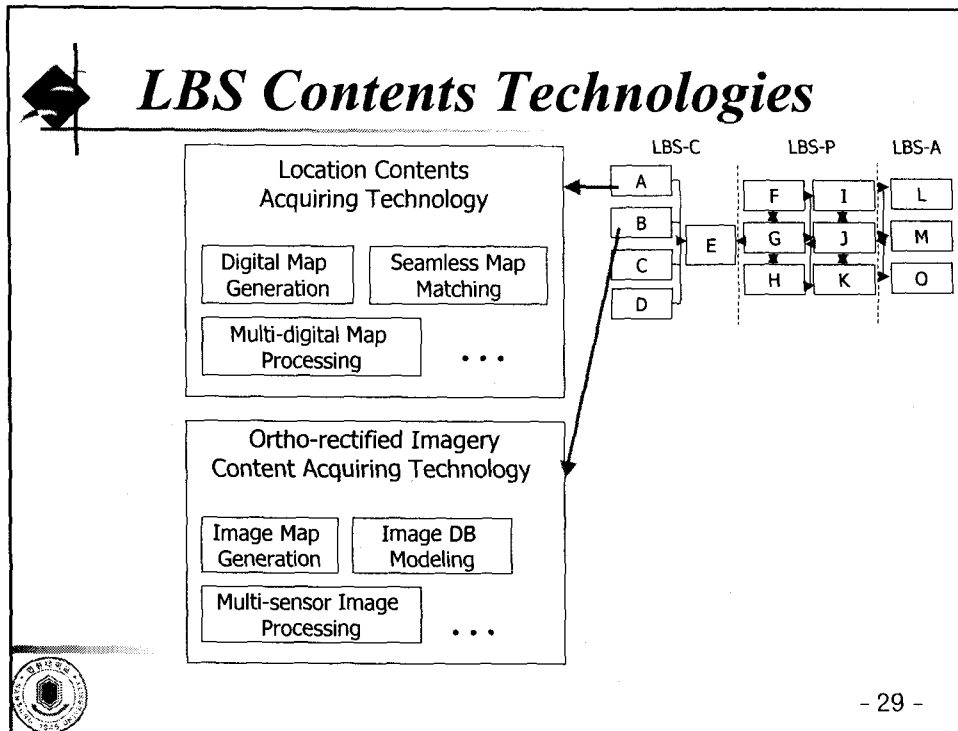
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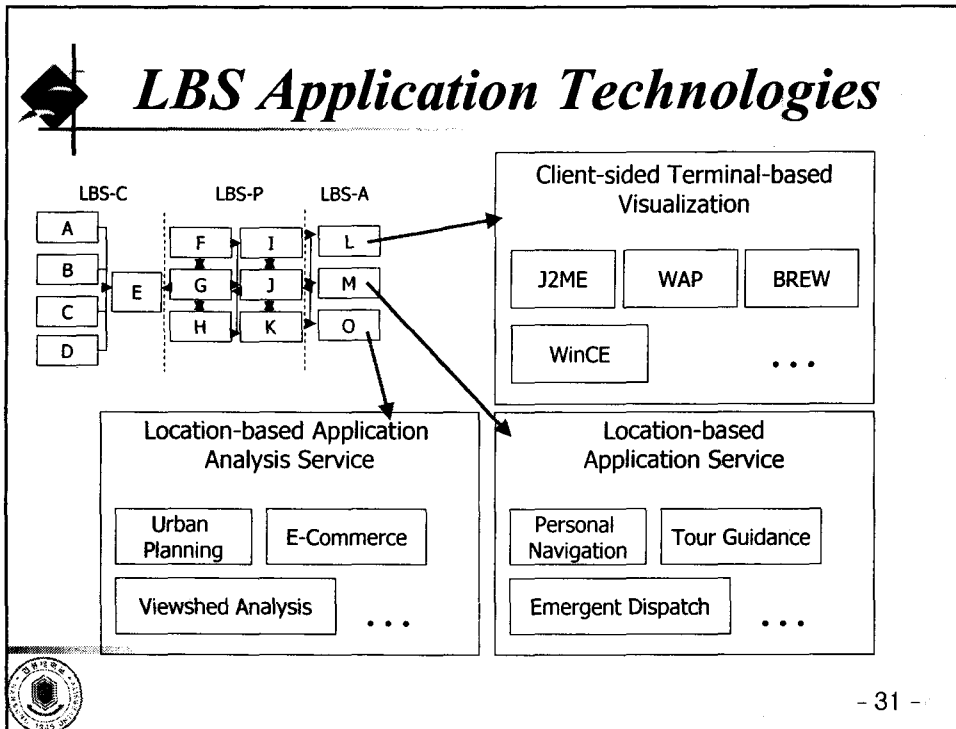


LBS Component-linkage



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- ## *Where is the Technology Headed ?*
- *Mobile devices become GPS enabled*
 - *Mobile Service providers will determine your location without GPS*
 - *GPS gets smaller and smaller*
 - *Java enabled phones*
 - *Predictive downloading of maps*
 - *Interactive vector graphics on PDAs*
 - *Ability to do ad-hoc queries from a PDA*
 - *Spatial data integration with disparate systems*
 - *Bluetooth enables your device to interact with the world*
 - *Your mobile device becomes your universal passport*
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Building Blocks of Location Services

Basic Functions

<i>Position</i>	<i>Distance</i>
<i>Route</i>	<i>Selection</i>
<i>Proximity</i>	<i>Description</i>
<i>Directory</i>	<i>Area</i>
<i>Distribution</i>	<i>Relationship</i>
<i>Suitability</i>	<i>Presentation</i>
<i>Inventory</i>	<i>Frequency</i>
<i>Pattern</i>	<i>Trend</i>

Location Servers

*Reports,
Graphic Views,
Messages*

Demographics

Directories

Positions

Routes

Maps

Sites

Assets

Events

Service Points

Transactions



Demand from 3 Broad Sectors ...

Resource & Land Management		Infrastructure Management
Parks & Recreation		Sewer and Water
Environmental Management		Transportation
Land Development	Community Info and Service	Telephone
Land Registry	Virtual City Hall	Oil and Gas Pipeline
Land Use Planning	Hospitality Services	Power
Agriculture	Health Services	Real Estate Property
Forestry	Public Safety	Asset Management
Fish & Wildlife	Emergency Services	
Exploration	Social Services	
	Town Planning	

*Note: For more detailed information,
Please refer to Session IV*





Eight Categories of Location Enabled Services

Services	Description
Local Information	<i>What's nearby, news & reviews, phone numbers, booking</i>
Navigation Assistance	<i>Route direction, live traffic news, public transport</i>
Community, Gaming	<i>Share my position with colleagues or peers</i>
Commerce	<i>Permission based on SMS, redeemable coupons</i>
Security	<i>My position, whereabouts of my car</i>
Resource Management	<i>Field staff management, logistics, assigning resources</i>
Emergency Services	<i>E911 positioning obligations</i>
Local Call Routing/Billing	<i>Mobile phone billing dependent upon location</i>



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LBS Applications by Location Accuracy

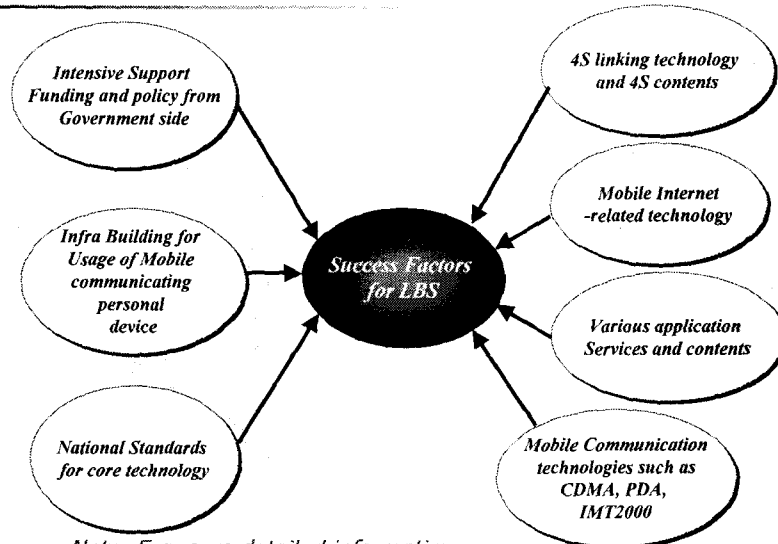
Location Accuracy	Application Types
Location independent	<i>Stock prices, news, bank transactions, email, agenda</i>
Regional (>100km)	<i>Weather report, regional news, generic traffic conditions</i>
District (up to 20 km)	<i>Local news, traffic report</i>
Up to 1 km	<i>Vehicle asset management, fleet management, congestion avoidance</i>
500 – 1000 m	<i>Emergency services, information services, point of interest search</i>
100 – 200 m	<i>Urban SOS, network maintenance, asset tracking, nearest point of interests</i>
10 – 100 m	<i>Turn-by-turn direction, asset location</i>
Less than 1 m	<i>Object identification, shop information</i>



Geo-informatics, April, 2001

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Success Factors for LBS



Note: For more detailed information,
Please refer to Session I

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Thanks !

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