

# Workshop on Standards in Action

## Pallanza, Italy, Oct 5, 2004



## Toward Implementing Draft CD ISO 19134

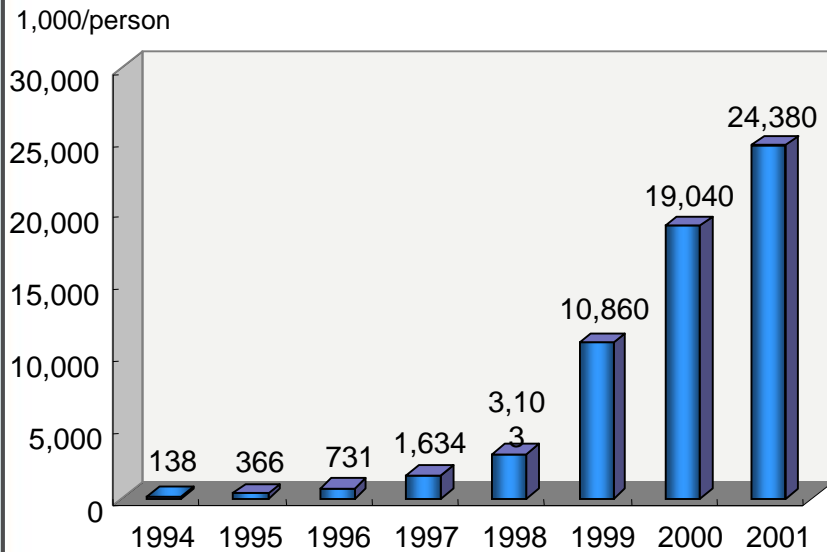
서울시 서초구 우면동 142번지 (한국교원단체총연합회6층) <http://www.ksic.net>

Tschangho Kim  
Head, Korea Delegates

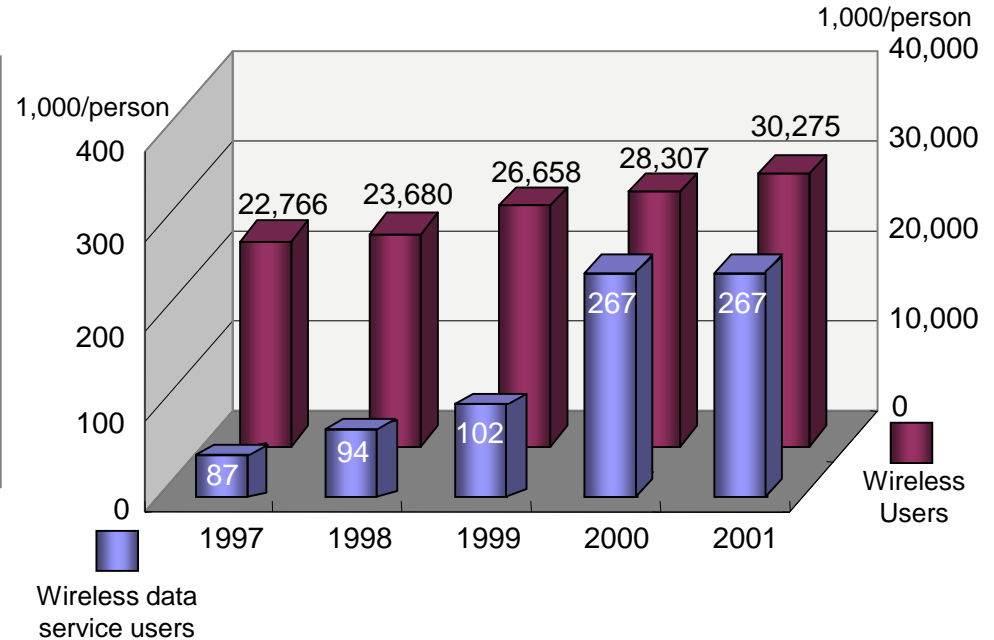
# Internet & Wireless Communication in Korea

- Since 1994, Growth of internet users double every year.
- Rapid Growth in Wireless communications (CP, PDA, Mobile PC, etc) and data service

[Internet users in Korea]



[Wireless communication & Data service]



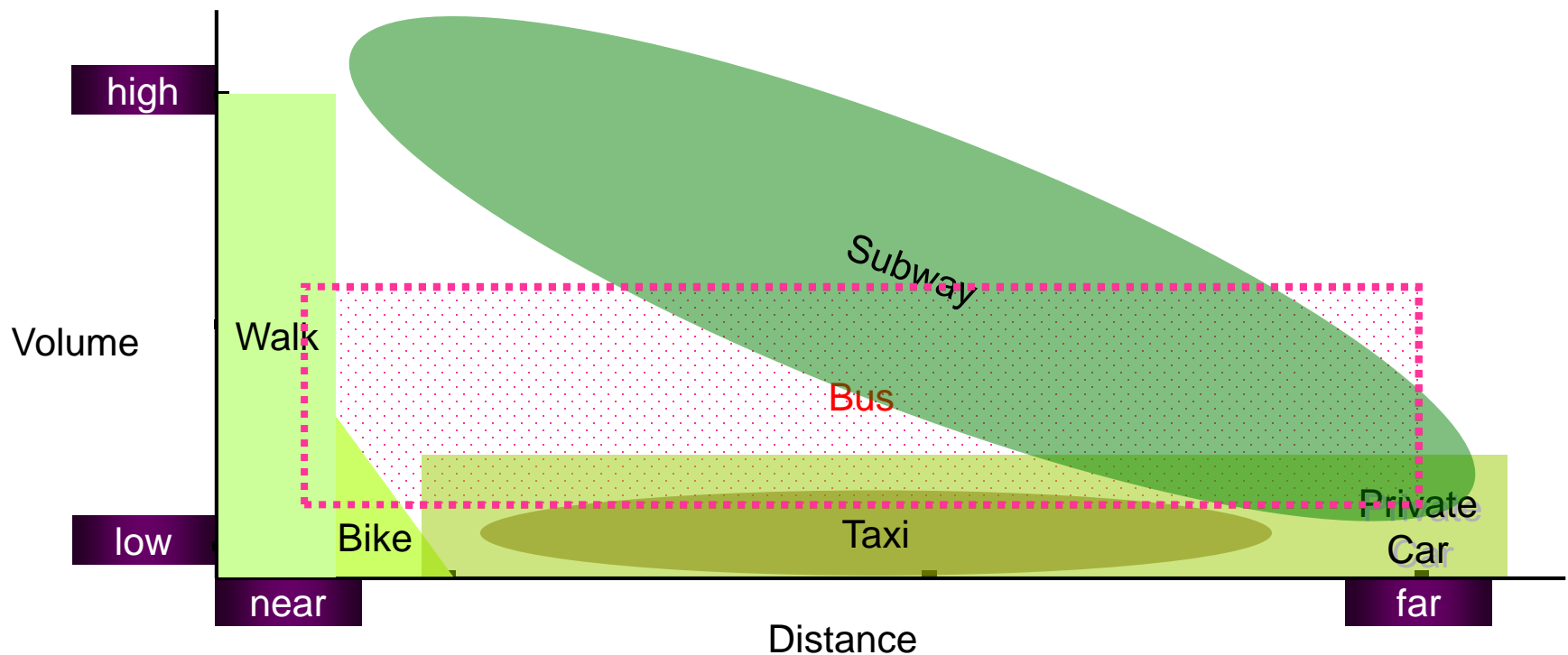
➔ Wireless communications such as CP, PDA, Mobile PC are major Information medium for daily activities and for data services in Korea

# I. Seoul Metropolitan Area: An Introduction



# Seoul Metropolitan Area

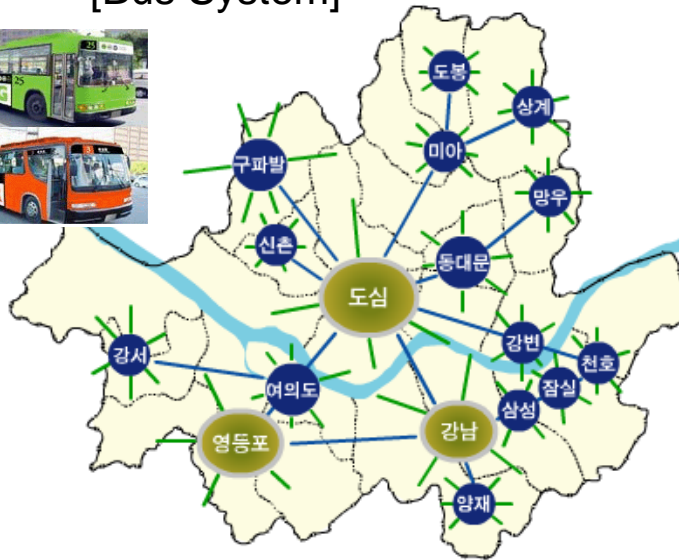
- Multimodal Users: 29,375,000 persons per day
- About 70% of daily travelers use public transit.
- Characteristics of Multimodal Users: See below .



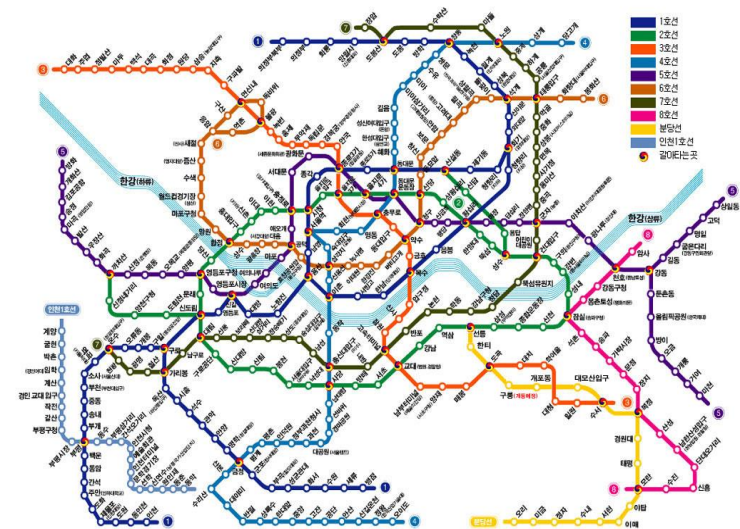
# Public Transit System in Seoul

- 6 Types of Buses: Feeder (G), Inter-District (B), Inter-City (R), District Circular (Y), Airport and City Tour.
- Subway: 16 lines
- Korea Rail: 6 lines
- The system provides services to every corner in Seoul, albeit complex routes and transfers

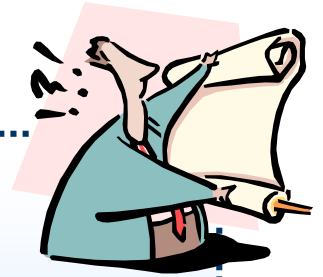
[Bus System]



[Subway System]

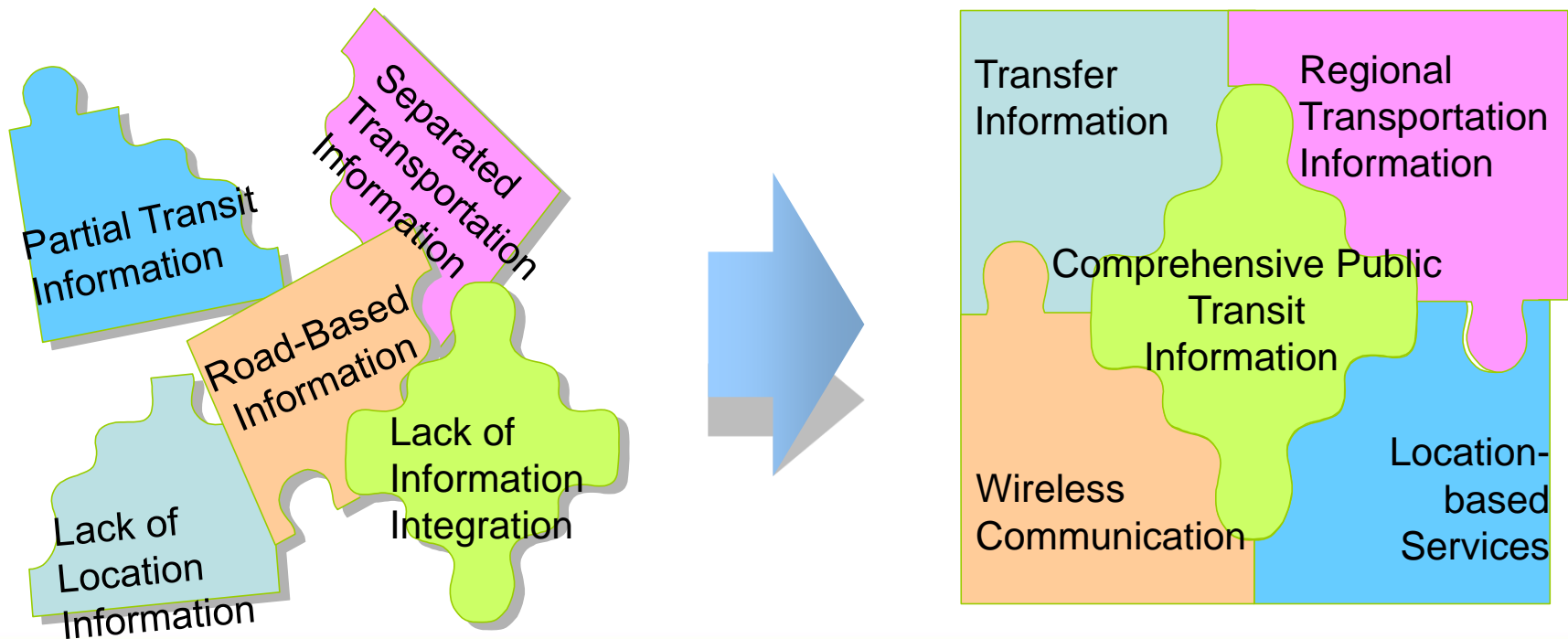


## II. Metropolitan Public Transit User Information System: ALGOGA



## Goal

- To enable travelers to search the most convenient transit route(s) using PDA, Internet or Cell Phone



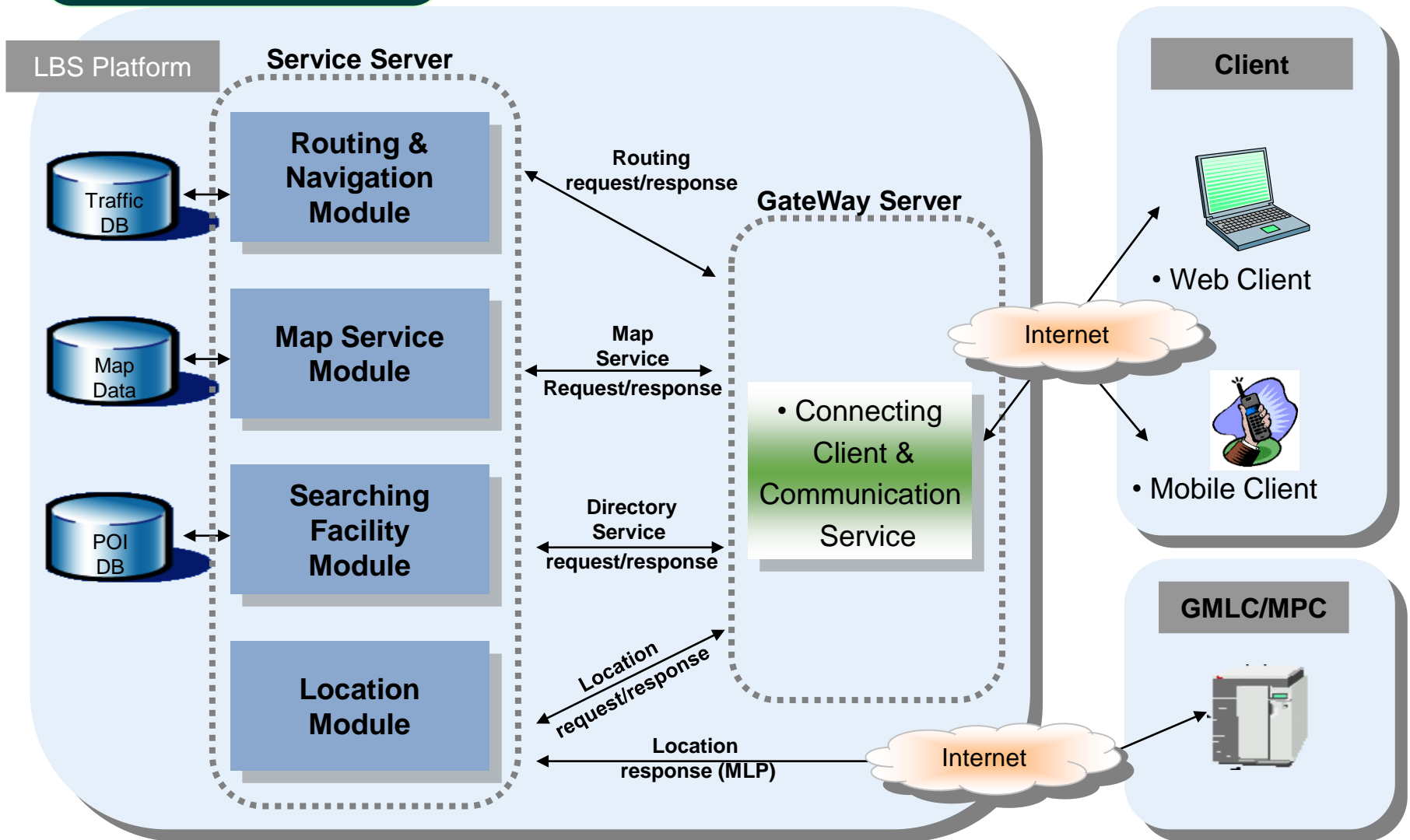
## feature

- Provision of comprehensive transit information for the Seoul Metropolitan area
- Provision of the “best” route(s) for users
- Provision of parking availability at transit transfer locations.
- Upgrade information frequently
- Currently 6,000 users per day



# ALGOGA

## System Architecture



MLP: Mobile Location Protocol; GMLC/MPC: GeoMobility Location Center/Mobile Positioning Center

## Database

Items	Route & Station	Content
Korea Rail	<ul style="list-style-type: none"> <li>• 6 railways, 81 stations</li> </ul>	<ul style="list-style-type: none"> <li>• Station location</li> <li>• Service information</li> </ul>
Subway	<ul style="list-style-type: none"> <li>• 16 lines, 344 stations</li> </ul>	<ul style="list-style-type: none"> <li>• Station location and exit information by lines</li> <li>• Services Information by station</li> </ul>
Inter-District Bus	<ul style="list-style-type: none"> <li>• Seoul 627 routes</li> <li>• In-cheon 111 routes</li> <li>• Local 1107 routes</li> </ul>	<ul style="list-style-type: none"> <li>• Bus stop location by routes</li> <li>• Service information by routes</li> </ul>
Airport and Inter-City Bus	<ul style="list-style-type: none"> <li>• Airport bus 44 routes</li> <li>• Long-distance bus 373 routes</li> </ul>	<ul style="list-style-type: none"> <li>• Location of bus stops by routes</li> <li>• Service Information by terminal and routes</li> </ul>
Parking Facility	<ul style="list-style-type: none"> <li>• 69 public parking places</li> </ul>	<ul style="list-style-type: none"> <li>• Location of public parking</li> <li>• Service Information</li> </ul>

## Bus routes Information

- Schedule by type for each route
- Arrival, departure and transfer information
- Station exits and connecting bus information
- Parking information for subway station
- Calculating the “best” route(s) including transfer(s) to Bus/Subway given origin and destination

The screenshot displays the ALGOGA web service interface in Microsoft Internet Explorer. The browser address bar shows the URL <http://www.algoga.go.kr/businfo/main.htm>. The page title is "수도권 대중교통이용정보시스템 - Microsoft Internet Explorer". The interface includes a navigation menu with options like "시내버스정보", "시외/고속버스정보", and "전철/지하철/철도정보". A search box is visible with the text "시내버스 노선정보" and "리스트로 검색". Below the search box, there is a table titled "버스노선검색결과" (Bus Route Search Results) with the following data:

버스번호	1노선(시청)	주사무소	서울특별시
버스유형	공항버스	첫차시간	5:50
운행간격	30분	막차시간	19:20
기점	시청	마용운임	
종점	김포공항	업체명	(해)대한항공

Below the table, there are links for "경유정류장", "코리안나눔터(프레스센터)", "김포공항", and "활화문". The interface also features a map showing a route in the Seoul area, with various districts labeled like "문명구", "종로구", and "마포구".

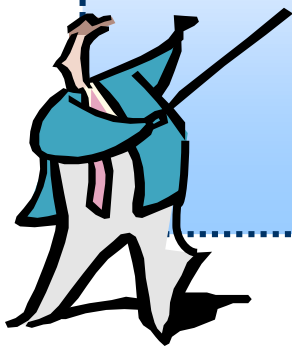
## Location based Public transit Information

- The same information as the bus route information based on user's current location
- Searching POI: Locating Schools, Hospitals and other POIs located nearby from User's current location



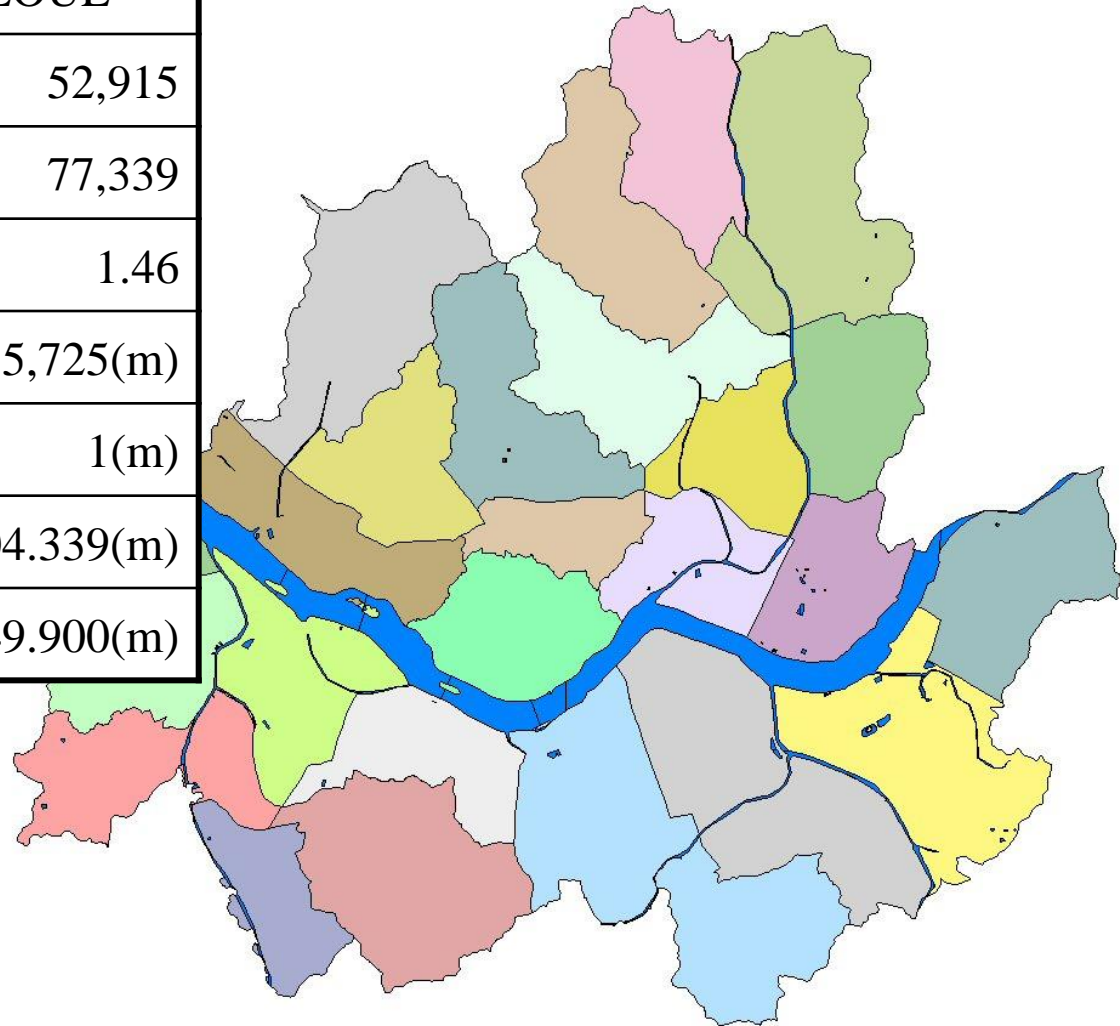


## III. A Simulation



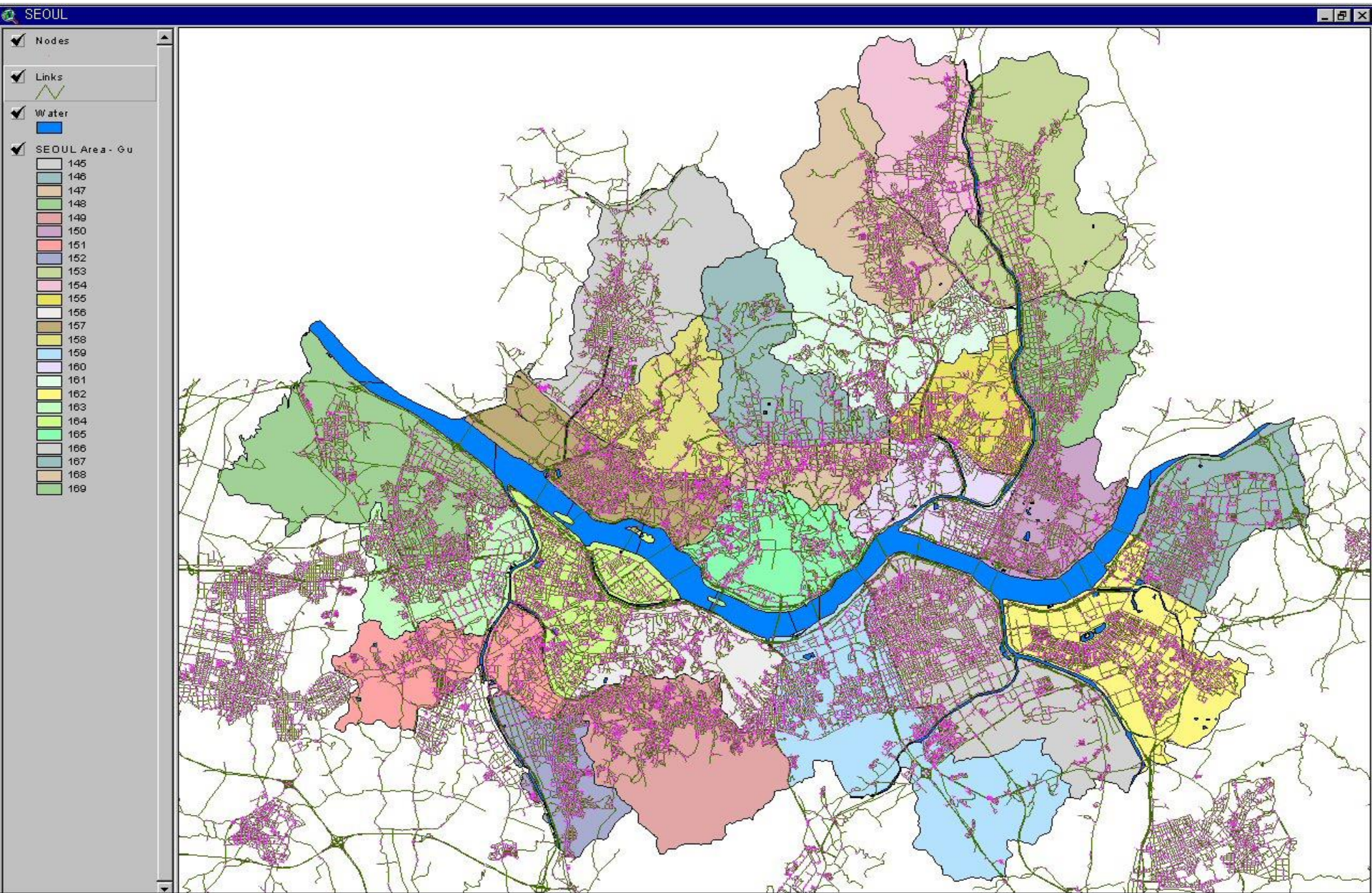
# Seoul Network Database

Network Name	SEOUL
Number of Nodes	52,915
Number of Arcs	77,339
Arc/Node Ratio	1.46
Maximum Arc Length	5,725(m)
Minimum Arc Length	1(m)
Average Arc Length	104.339(m)
Standard Deviation	149.900(m)





# Transportation Network in Seoul



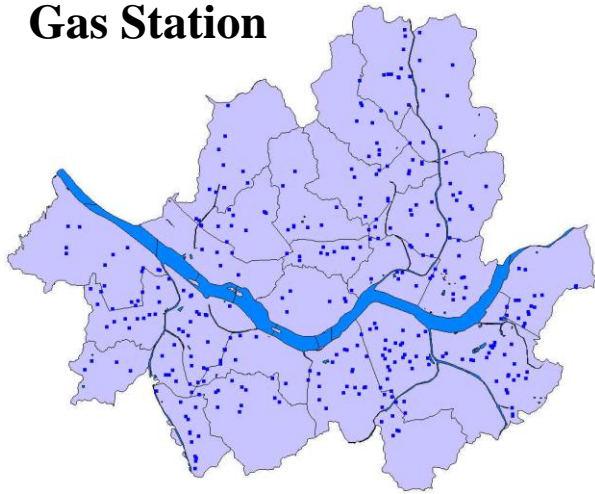
# POI Database

POI Name	Number of POIs	Item Name	Unit	Price Range (5 classes)
Gas Station	348	Gasoline	Liter	1,000 ~ 1,500
Pharmacy	350	Medicine	Bottle	10,000 ~ 25,000
Flower Shop	210	Roses	stick	1,000 ~ 1,500
Bakery	200	Cakes	box	10,000 ~ 15,000
Auto Repair Shop	140	Service	Service Fee	20,000 ~ 45,000

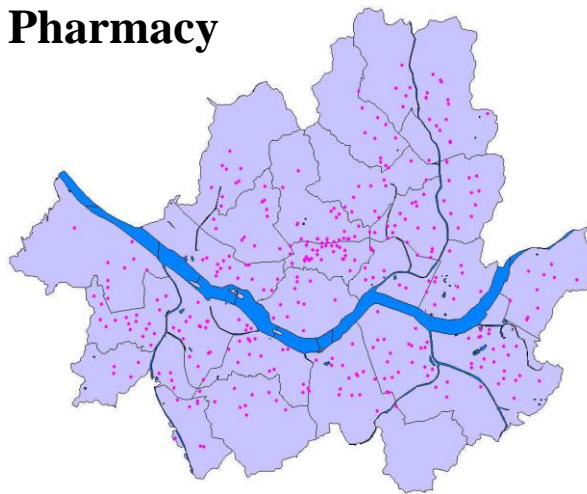


# Location of POI's

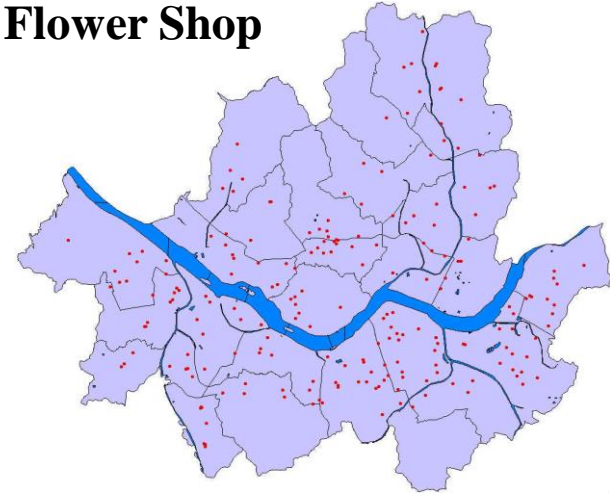
**Gas Station**



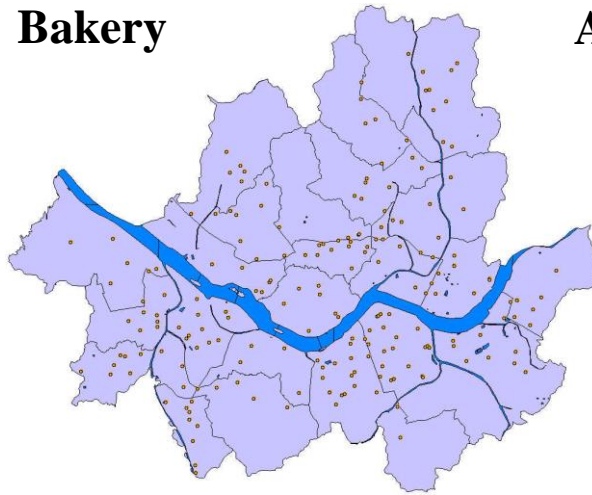
**Pharmacy**



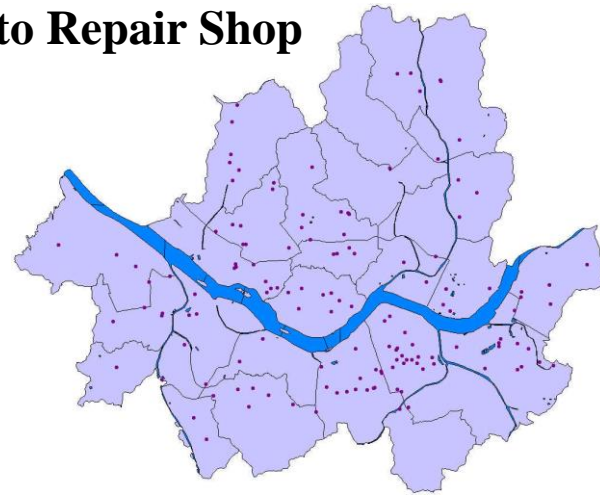
**Flower Shop**



**Bakery**



**Auto Repair Shop**



# Simulation for a Multimodal LBS – Service Request

Scenario: On the way from Office to Home

- Items and quantity for purchase
  - Gas Station – 30 liters of gasoline
  - Flower Shop – 12 roses
  - Bakery – 1 birthday cake
- Scenario 1: Private Car
  - Origin: Office at Gimpo Airport
  - Destination: Home at Sinlim-Dong
- Scenario 2: Bus and Subway
  - Origin: Office at Naksungdae
  - Destination: Home at Garak-Dong

Service Request Panel

O-D Selection

Origin: 김포공항역

Destination: 서울대입구역

Selection by Map

Mode Preferences

Car  Bus  Subway

Transit (Bus + Subway)

Stops/Shopping

Shopping Items	Quantities
Gas Station	30
Flower Shop	25
Bakery	1

Euclidean Distance Only

Traffic Information Panel

Average Speed: 50 Km/s

Real Time Information

Multimodal SPF RUN

Searching Panel

Searching Progress: 

Searching Time: 00min, 14sec.

ITS/GIS-T Lab, @ Seoul National Univ.

# Simulation Result for a Multimodal LBS: Scenario 1-Alternative 1

A Simulation System for a Multimodal LBS Model - ShortPath

File(E) Edit(E) Results(I) View(V) Help(H)

Service Request Panel

O-D Selection

Origin: 김포공항역 ...

Destination: 서울대입구역 ...

Selection by Map

Mode Preferences

Car  Bus  Subway

Transit (Bus + Subway)

Stops/Shopping

Shopping Items Quantities

Gas Station 30

Flower Shop 25

Bakery 1

Euclidean Distance Only

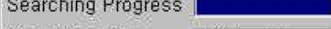
Traffic Information Panel

Average Speed: 50 Km/s

Real Time Information

Multimodal SPF RUN

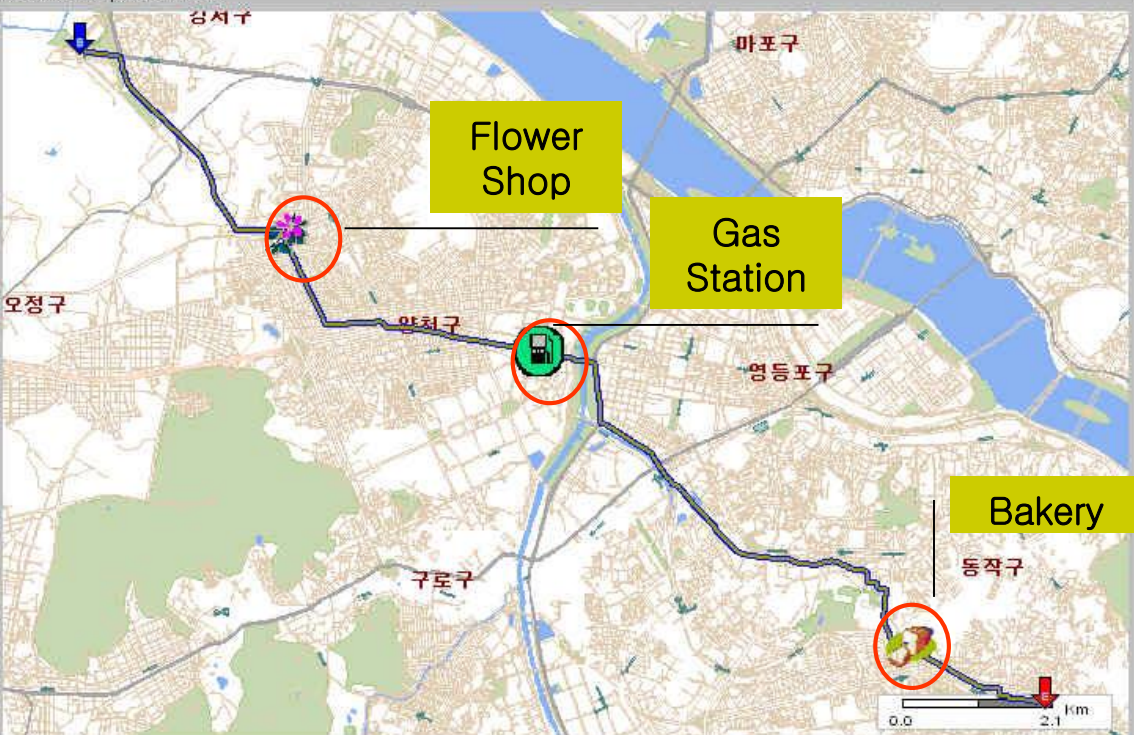
Searching Panel

Searching Progress 

Searching Time 00min, 14sec.

ITS/GIS - T Lab. @ Seoul National Univ.

Service Response Panel



Flower Shop

Gas Station

Bakery

Route Alternatives

	Total Cost	DC	TC	PC
<input checked="" type="radio"/> Route 1	68345	2225	1119	65000
<input type="radio"/> Route 2	68353	2230	1122	65000
<input type="radio"/> Route 3	68372	2243	1129	65000

Route Directions

총이동거리 : 18,663 km  
총소요시간 : 0시 22분 23초

X : 185742,902 Y : 451448,733

CAP NUM

Solution Time



# Simulation Result for a Multimodal LBS: Scenario 1-Alternative 2

A Simulation System for a Multimodal LBS Model - ShortPath

File(E) Edit(E) Results(I) View(V) Help(H)

Service Request Panel

O-D Selection

Origin: 김포공항역 ...

Destination: 서울대입구역 ...

Selection by Map

Mode Preferences

Car  Bus  Subway

Transit (Bus + Subway)

Stops/Shopping

Shopping Items	Quantities
Gas Station	30
Flower Shop	25
Bakery	1

Euclidean Distance Only

Traffic Information Panel

Average Speed: 50 Km/s

Real Time Information

Multimodal SPF RUN

Searching Panel

Searching Progress

Searching Time 00min, 14sec.

ITS/GIS-T Lab, @ Seoul National Univ.

Service Response Panel

Route Alternatives

	Total Cost	DC	TC	PC
<input type="radio"/> Route 1	68345	2225	1119	65000
<input checked="" type="radio"/> Route 2	68353	2230	1122	65000
<input type="radio"/> Route 3	68372	2243	1129	65000

Route Directions

총이동거리 : 18.711 km  
총소요시간 : 0시 22분 27초

X : 191669,044 . Y : 447527,022

CAP NUM

# Simulation Result for a Multimodal LBS: Scenario 1-Alternative 3

A Simulation System for a Multimodal LBS Model - ShortPath

File(E) Edit(E) Results(I) View(V) Help(H)

Service Request Panel

O-D Selection

Origin: 김포공항역 ...

Destination: 서울대입구역 ...

Selection by Map

Mode Preferences

Car  Bus  Subway

Transit (Bus + Subway)

Stops/Shopping

Shopping Items	Quantities
Gas Station	30
Flower Shop	25
Bakery	1

Euclidean Distance Only

Traffic Information Panel

Average Speed: 50 Km/s

Real Time Information

Multimodal SPF RUN

Searching Panel

Searching Progress

Searching Time 00min, 14sec.

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Service Response Panel

Gas Station

Flower Shop

Bakery

Route Alternatives

	Total Cost	DC	TC	PC
<input type="radio"/> Route 1	68345	2225	1119	65000
<input type="radio"/> Route 2	68353	2230	1122	65000
<input checked="" type="radio"/> Route 3	68372	2243	1129	65000

Route Directions

총미동거리 : 18.817 km  
총소요시간 : 0시 22분 34초

X : 186854.053 , Y : 441840.540

CAP NUM





# Simulation Result for a Multimodal LBS: Scenario 2-Subway Alternative

A Simulation System for a Multimodal LBS Model - ShortPath

File(F) Edit(E) Results(I) View(V) Help(H)

Service Request Panel

O-D Selection

Origin: 서울대입구역 ...

Destination: 강남역 ...

Selection by Map

Mode Preferences

Car  Bus  Subway

Transit (Bus + Subway)

Stops/Shopping

Shopping Items Quantities

Flower Shop 30

Bakery 1

Pharmacy 1

Euclidean Distance Only

Traffic Information Panel

Average Speed: 30 km/h

Real Time Information

Multimodal SPF RUN

Searching Panel

Searching Progress

Searching Time 00min, 00sec.

ITS/GIS-T Lab., © Seoul National Univ.

Service Response Panel

Pharmacy

Flower Shop

Bakery

서초구

0.0 1.1 km

Route Alternatives

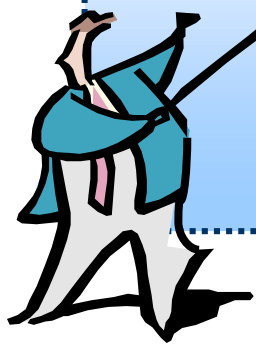
	Total Cost	DC	TC	PC
<input checked="" type="radio"/> Route 1	65375	700	675	64000
<input type="radio"/> Route 2	0	0	0	0
<input type="radio"/> Route 3	0	0	0	0

Route Directions

서울대입구 (2호선) -> 강남 (2호선)

X : 195466,095 , Y : 443421,932

CAP NUM



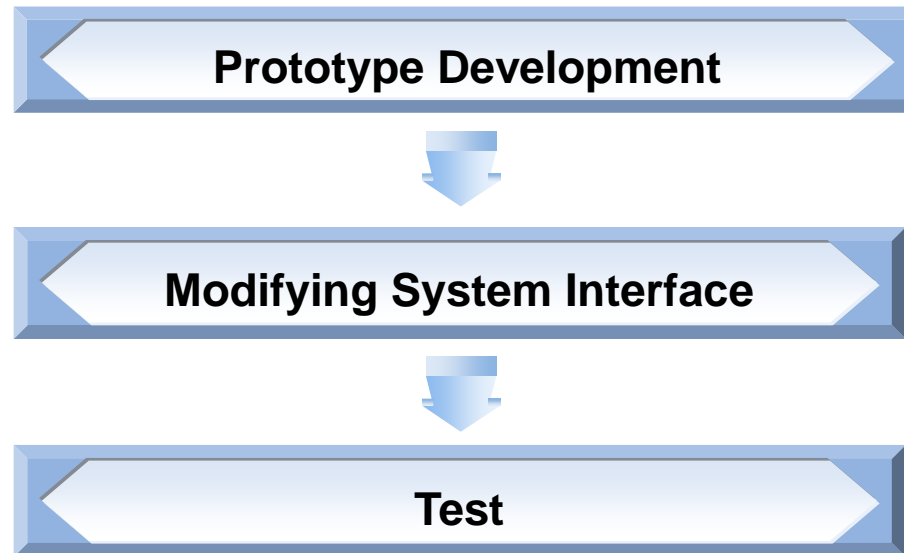
## IV. Future Work



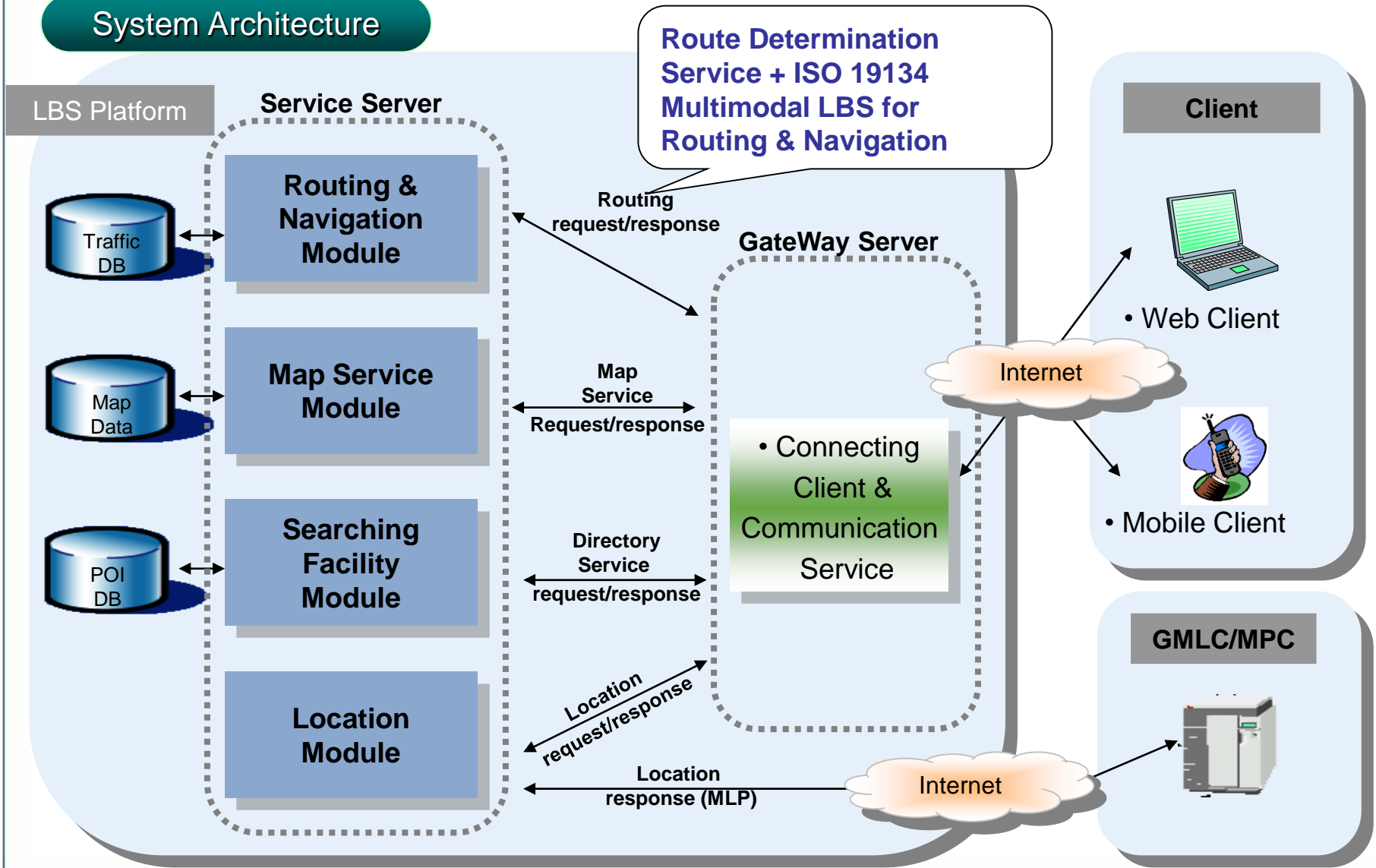


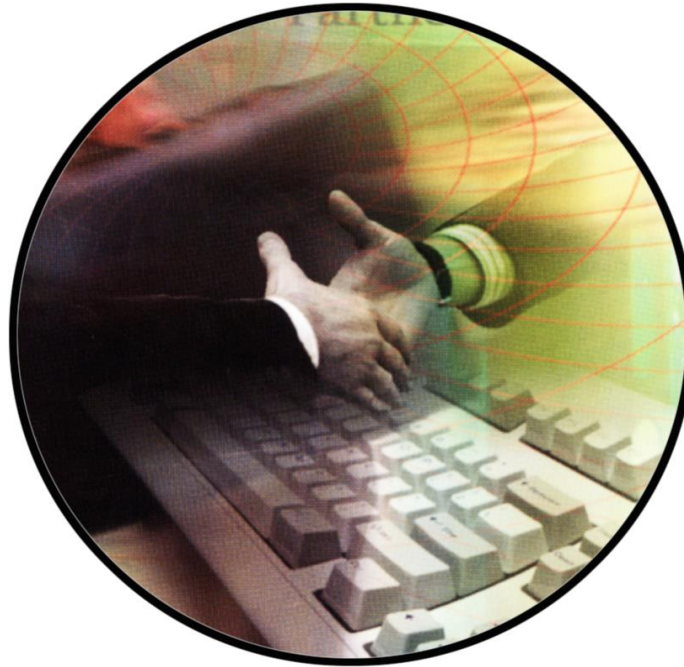
## Standardization

- Testing of the draft CD ISO 19134 Multimodal LBS for Routing and Navigation



## System Architecture





Thank you!