

# Seamless Positioning and Its LBS Application for Megacity Behemoth

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# Seamless positioning and LBS

- Megacity behemoth
  - Large scale
  - Huge population
  - High density
  - Active social activity
  - Poor GNSS signal
- Benefits
  - New invented applications
  - New lifestyle
  - New era of GNSS as a necessity to everyday life



# Seamless positioning – current status

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## □ Emerging technologies

- GNSS and extension: Weak signal GNSS, pseudolite
- New signals: WiFi, SOOP, UWB, RFID
- New methods: Vision and optics, INS aiding

## □ Solutions

- Private, Separated, Isolated

## □ Objective

- A united, open platform for seamless positioning and LBS applications



# Why WiFi as the primary method?

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Infrastructure

- Numerous existing and increasing hotspots

Terminal

- Numerous existing and increasing smartphones/MIDs

User cultivation

- Carrier independent

Standardization

- IEEE 802.11a/b/g/n

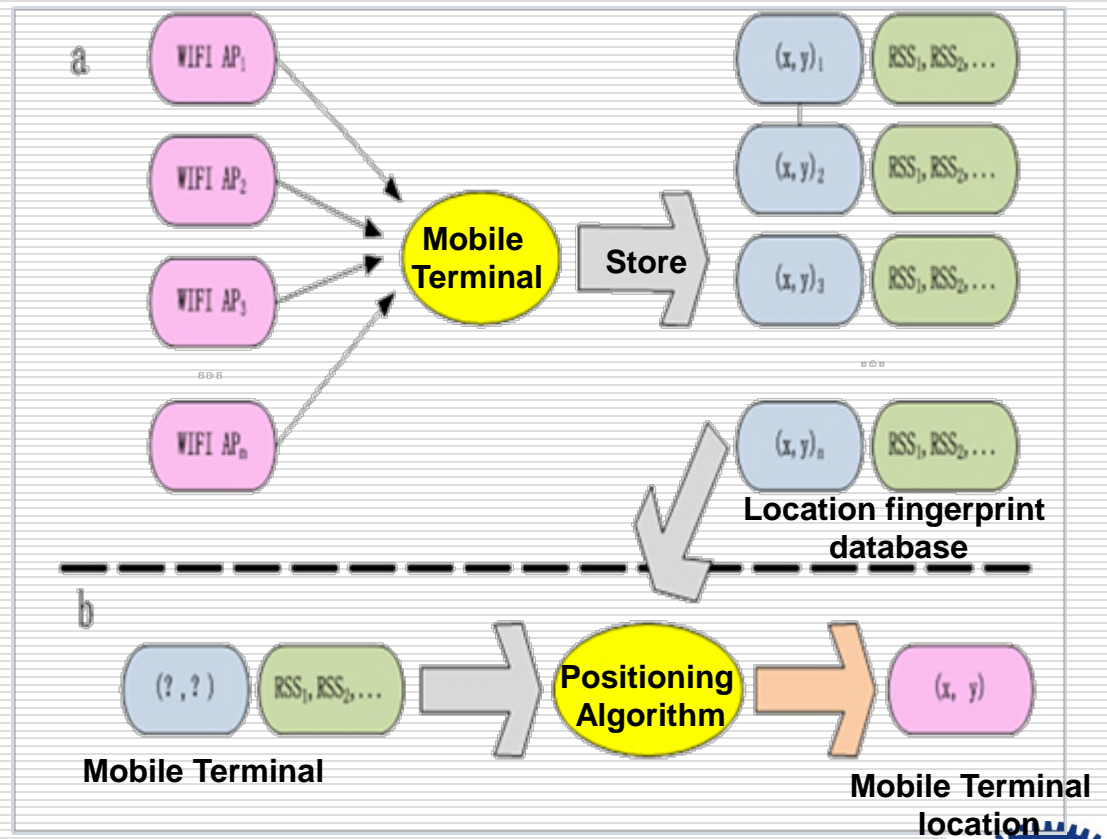
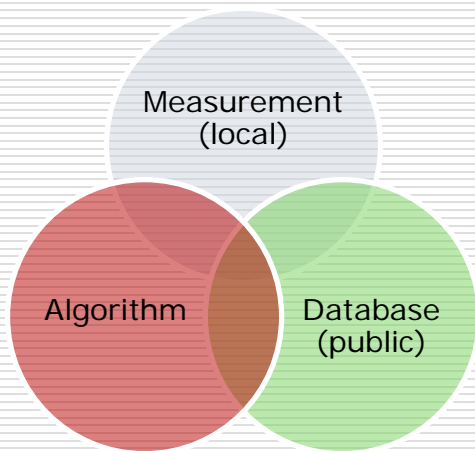
Requirements

- Unification of Internet, wireless communication and positioning.

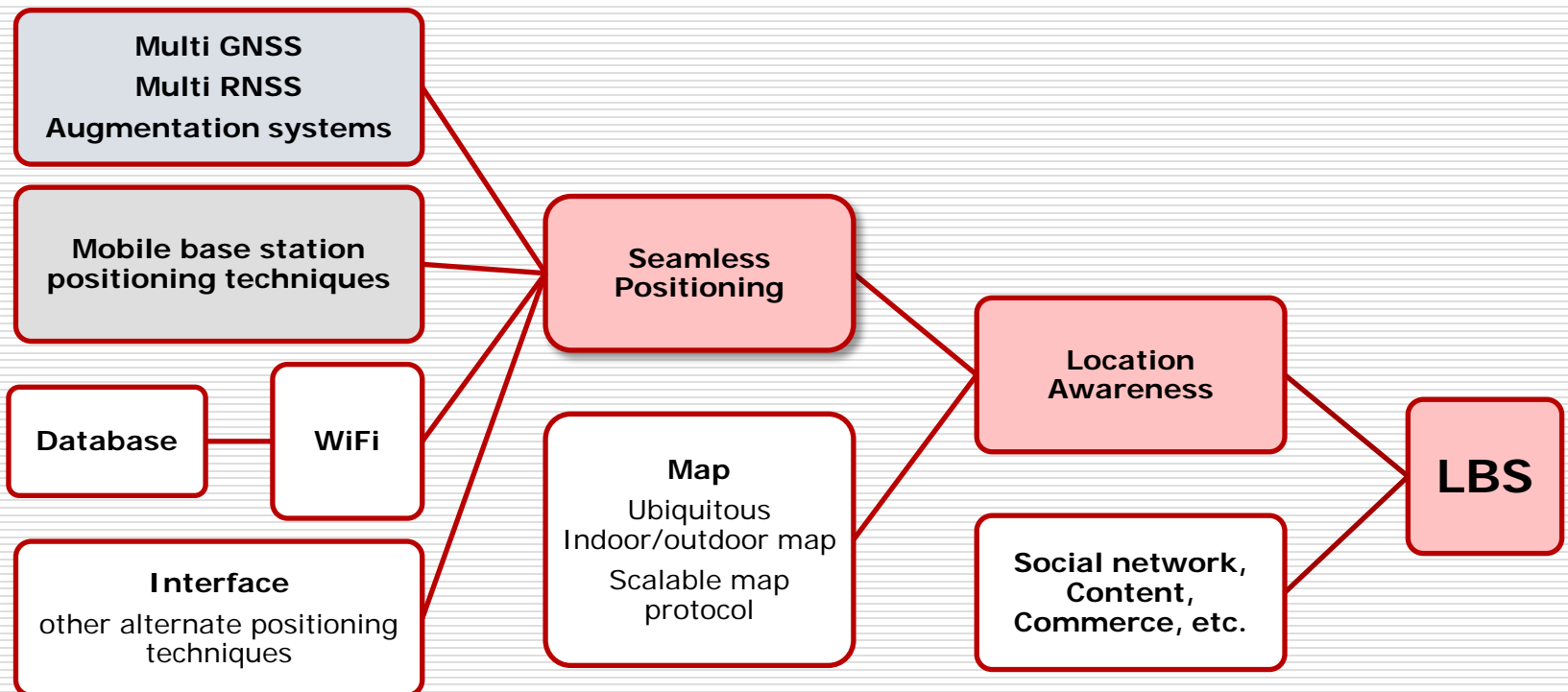


# WiFi positioning principle

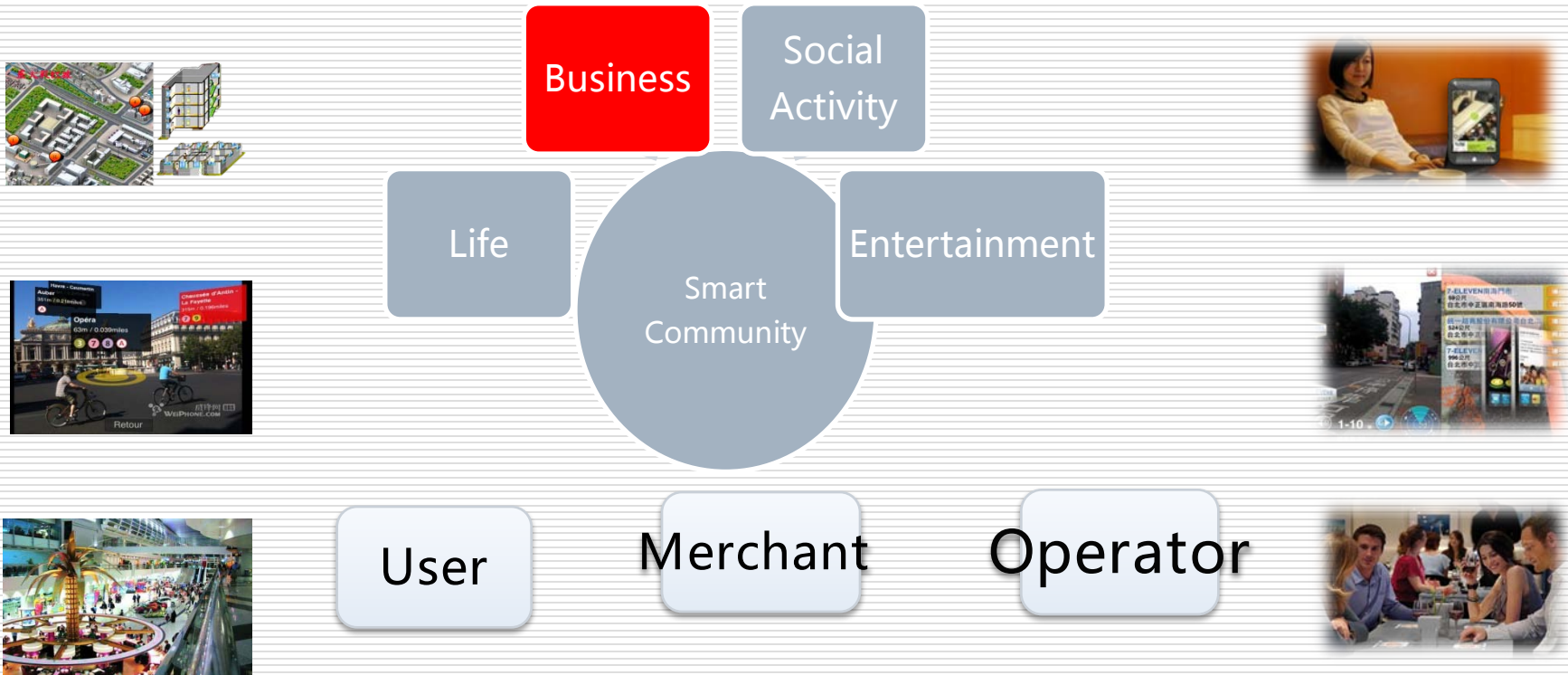
## □ Elements



# Towards LBS



# Integrated Service of Smart Community



Integrated community services based on high precision indoor and outdoor seamless positioning and mobile Internet technology

# Application

Security & Safety

Safety Services

Ambulance, Medic care, Search and Rescue

Security Services

Emergency locating and response, Zone restriction, Public crisis warning and intervention

Productivity

Navigation and Info

Road info, Local guide, Navigation, Route plan

Tracking and dispatching

Personnel, Vehicle, Asset, Animal, Hazardous containers

Tolling

Location based tolling

Recreation

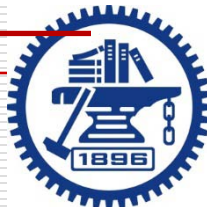
Entertainment

Social network, gaming

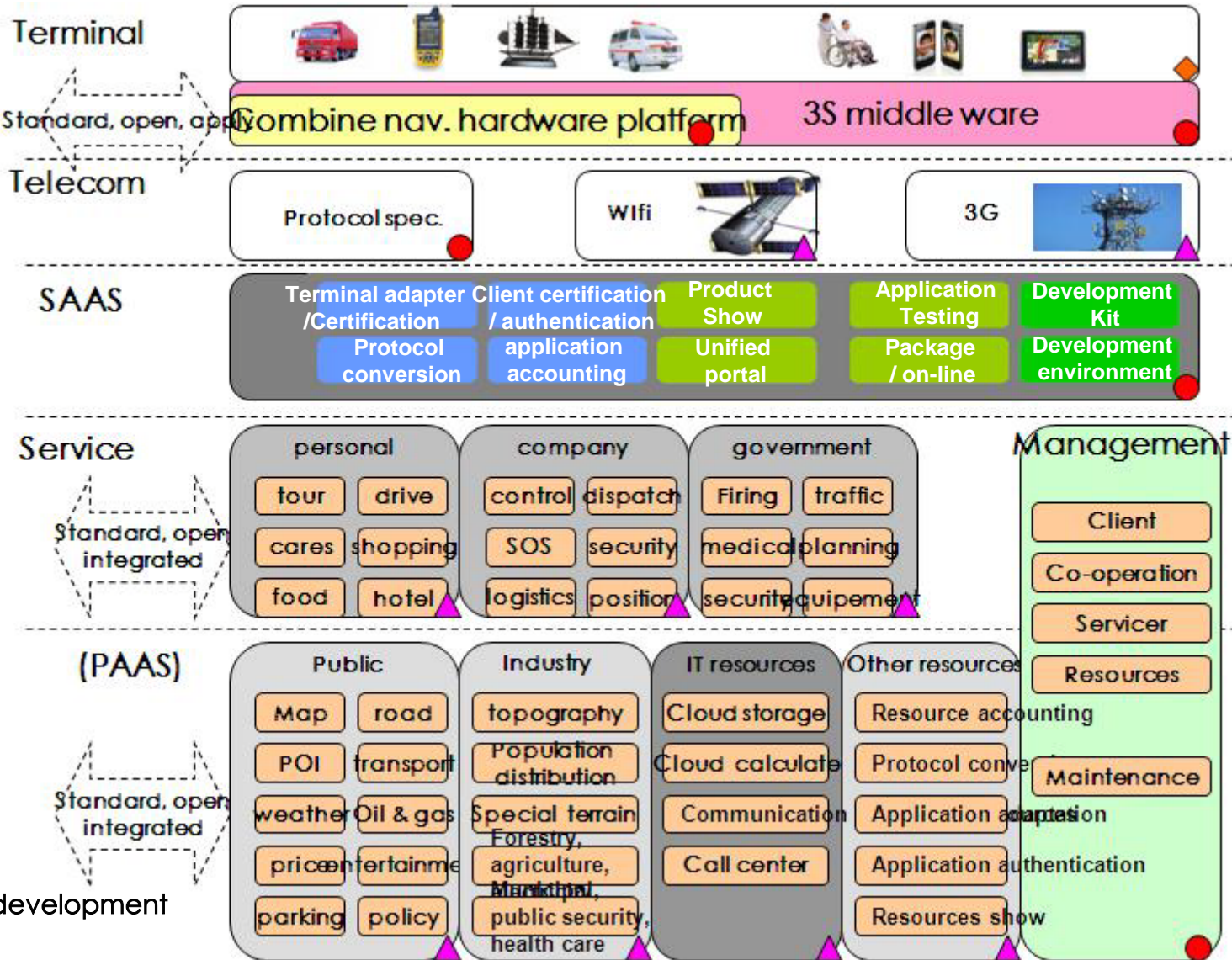
Commerce

Payment and billing

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**Legend:**

- Design and development
- ▲ integrating lease
- ◆ Displacement application



# Public LBS System – Openness, innovation

## □ Virtual infrastructure

- Internet
- Mobile communication
- Navigation

## □ Technical issues

- Unified positioning method
- Public service platform
- Application developing

## □ Key points

- Promotion of the LBS industry
- Selected key applications
- Value-added development



# Participants and roles

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Authority

- Policy making, standardization, planning and coordination, IP

System integrator

- Integration of all services

Core provider

- Internet connection, positioning, database, map

Other provider

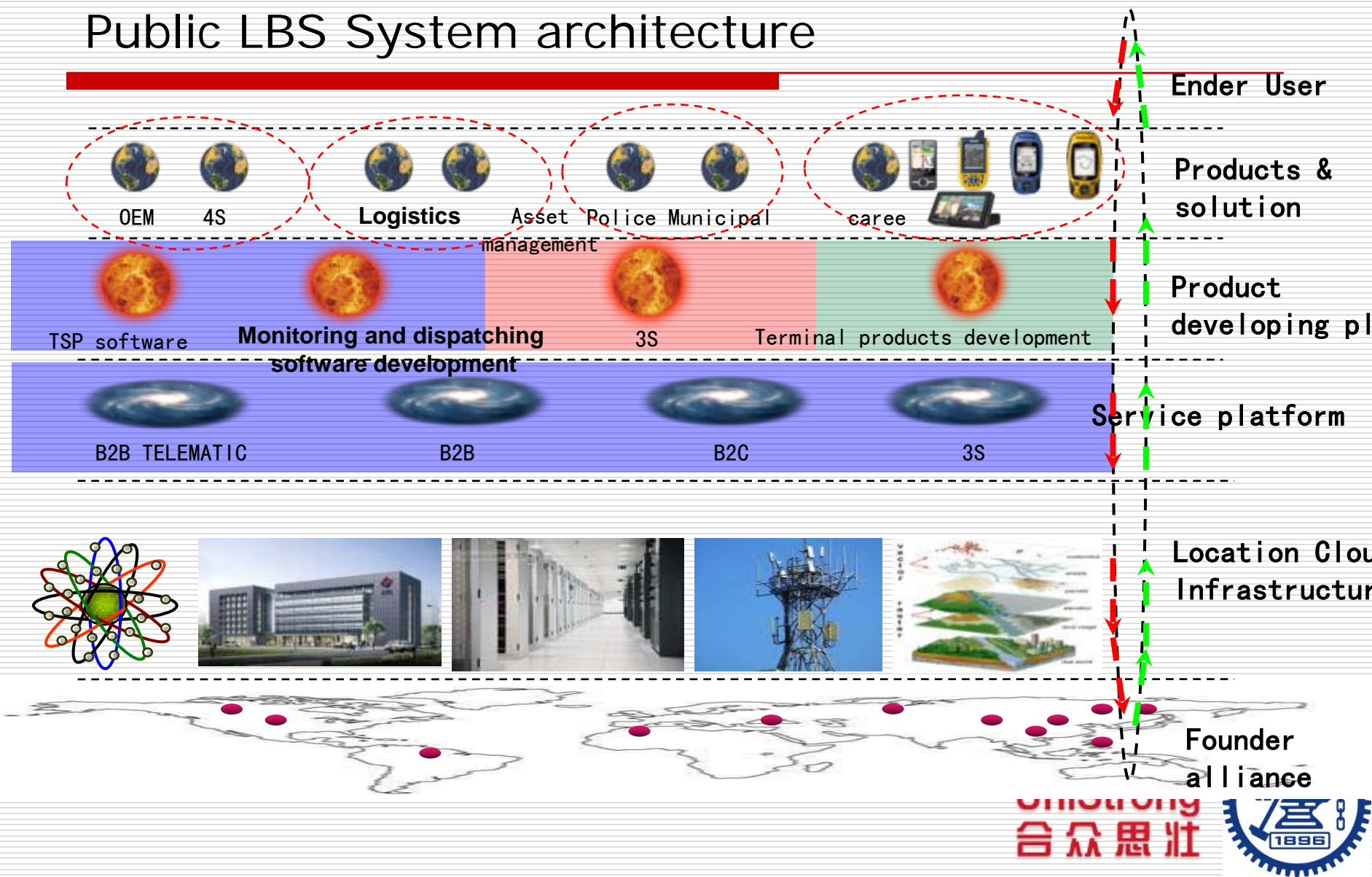
- Application, social network, business

Academia

- Technology innovation



# Public LBS System architecture



# Public LBS System – tasks and plans

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- Development of an open LBS platform in Shanghai
  - Indoor and outdoor seamless positioning signal system and navigation message protocol
  - Public location service platform access and service standards
  - Implementation of indoor/outdoor positioning system in Shanghai downtown
- The Yangtze River delta multi-level dynamic space data service
- Identity specific access and services for tailored network terminals in different areas



## Shanghai test bed – City facts

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### □ Megacity

- Population: 20 million permanent residents (2010)
- 14 cars per 100 households
- 963 thousand enterprises

### □ Smart city

- 11 million mobile phone users
- Home WiFi: 1.3 million (2011); 4.5million (est.) (2013) and growing
- Public WiFi: over 40,000 (53% in Office, malls and hotels) and growing





# Performance specification

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- Coverage
  - Shanghai public areas (>500 sq. kms)
  - <20000 blind spots
  - 90% of population
  - 4 million users
- Variable precision based on area and requirement
- Availability: >99.999%
- Processing delay: less than 100 ms
- Throughput: processing more than 600 thousand requests per second(single point 5000 requests)



# Timeline

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## 2012 Preparation

- Incorporation of existing mobile communication network and CORS
- Development of location service infrastructure by carriers and position service providers

## 2012-2013 Construction

- Involvement of application developers
- Promotion of on-the-go applications: LBS SNS, business, etc.

## 2014-2015 Application

- Full interactivity between device/technology/service/map/content/business providers
- Popularization of applications to a certain scale
- Social and economical profits





# Work for the future

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- Cooperation and interaction within the Application Subgroup of ICG WG-B
- New technologies
- New applications
- Working items
  - Standards
  - Protocols
  - Adoption and fusion
  - Etc.



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# Thanks for your attention!

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