

Information Services with Ad-hoc Network

Yoji ISHII, Koichi ASAKURA, Toyohide WATANABE

Watanabe Laboratory, Department of Systems and Social Information,
Graduate School of Information Science, Nagoya University

Simulator for Inter-vehicle Communication (IVC)

Inter-vehicle communication (IVC)

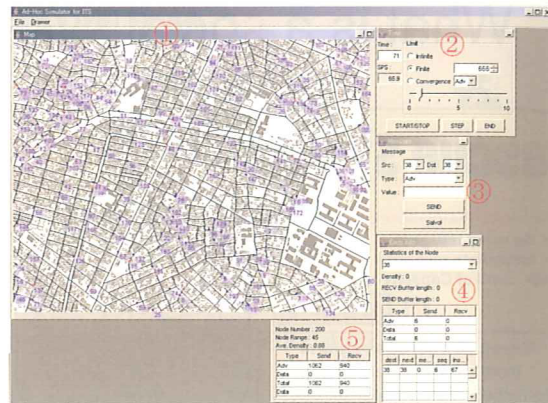
- Supporting safety driving
- Providing traffic information
- Difficult to evaluate network protocol for IVC**
 - Lacking of hardware (e.g. antenna, transmitter, etc.)
 - Impossible to experiment using plenty of vehicles

Development of simulator for IVC

- Using accurate GIS information
 - Road information, building information
- Applying accurate radio communication model
 - Line of sight model, KAJI model, etc.

Evaluating network protocol for IVC

- Analyzing network traffic
- Estimating possibility of new network services



Simulator for Inter-vehicle communication

- ①: simulation field
- ②: time manager
- ③: packet creator
- ④: status window for each node
- ⑤: statistics window

Location-based Information Services (LBS) using Ad-hoc Network

Location-based information should be present in area where it is provided.

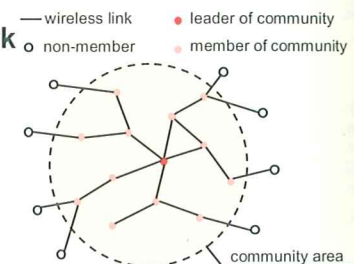
- Providing adequate information according to user's current location
- Providing location-based information immediately for applicable users

- Mobile terminals in the area keep/share/manage location-based information cooperatively on ad-hoc network.

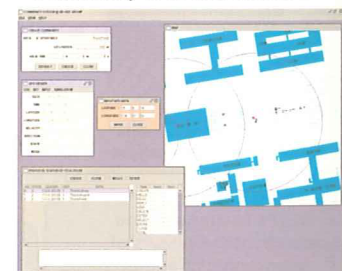
Modeling mobile terminals and area where information is provided

- Defining area to provide location-based information as Community Area (CA)
- Defining member of community as mobile terminals in CA

- Realizing LBS by delivering community information among mobile terminals
 - Community information: location-based information, CA information, etc.



Community area and member



Interface of community system

Problem 1: change of community members as mobile terminals move

- Notifying existence of community by member's hello packet
- Sharing community information in bucket brigade manner

Problem 2: situation in which no member exists in CA

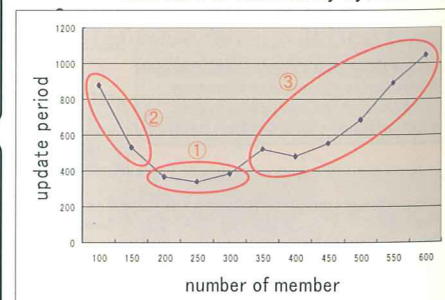
- Mobile terminals around CA keep information temporarily instead of members

Problem 3: consistency of location-based information

- Selecting a leader member in community
- Updating with leader member's permission and acceptance

Simulation experiment

- Objective: evaluation of time period for updating location-based information
- Simulation setting
 - Fields: 600m × 600m, Communication range: 100m, Velocity: 40km/h
 - CA = all fields (no change of community members)
 - Examining average time of ten updates as number of members changes
- Experimental result
 - When number of members is 200-300 (average neighbors: 11-16), update period is 3□Out (7 second).



Time for updating information

- ①: updating within 3□Out (7second)
- ②: increasing caused by network division
- ③: increasing caused by radio collision