CS 795/895
Vehicular Networks

Presentation Round 3 - Wrap-Up

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Round 3 (VANET 2006) - Wrap-Up
Papers Presented

- Improved Security in Geographic Ad Hoc Routing through Autonomous Position Verification
  - » DaimlerChrysler and Ulm University
- Cooperative Collision Warning Using Dedicated Short Range Wireless Communications
  - » HRL Labs and GM
- IEEE 802.11 based Vehicular Communication Simulation Design for NS-2
  - » DaimlerChrysler
- Decentralized discovery of free parking places
  - » Volkswagen and University of Duesseldorf
- Efficient Coordination and Transmission of Data for Vehicular Safety Applications
  - » UIUC and Toyota Technical Center
- Efficient Secure Aggregation in VANETs
  - » EPFL (Switzerland) / Hubaux's group
- Towards Lightweight Information Dissemination in Inter-Vehicular Networks
  - » Politecnico di Milano (Italy)

Round 3 - Wrap-Up
Position Verification

- Goal is to detect cheating nodes
  - » cheating = providing false location information
- Presents various techniques
  - » acceptance range threshold
  - » mobility grade threshold
  - » maximum density threshold
  - » map-based verification
  - » position claim overhearing
- Simulation using ns-2
  - » both city and highway environments
- Metrics: delivery success ratio, detection rate, false positives

Round 3 - Wrap-Up
Collision Warning

- Explores feasibility of DSRC for collision warning systems
- Simulation using QualNet
  - » tested in low density and high density traffic
- New Metrics
  - » packet inter-reception time
  - » cumulative number of packet receptions
  - » packet success probability
  - » per-packet latency
- Shows that distance affects packet success probability
- Suggests some broadcast rate adaptations to achieve better performance

Round 3 - Wrap-Up
DSRC for ns-2

- Focuses on changes to ns-2 physical layer needed to accurately model DSRC
- Provides details on DSRC
- It is unclear how these results were validated
  - » comparisons were only made to original ns-2 code, not to actual measurements

Round 3 - Wrap-Up
Free Parking Places

- Addresses the problem of finding free parking places in a city
  - » parking *automats* must be aware of occupancy of parking places
- Divides city into hierarchical grid tree structure
- Aggregates data at different levels of the hierarchy
- Simulation using VISSIM and ns-2

Round 3 - Wrap-Up
Efficient Coordination

- Describes *Message Dispatcher* (MD)
  - » Society of Automotive Engineers (SAE) standards-track
- MD sits between applications and the network stack
- Applications may have different data requirements and different frequency requirements
- MD allows applications to send/receive similar data without duplicating the data
- Analysis and prototype rather than simulation

Round 3 - Wrap-Up
Efficient Secure Aggregation

- Uses groups and group leaders to achieve secure aggregation
- Assumes that there is a majority of honest vehicles in any group
- Group dimensions are determined geographically
  - » location-based groups
- Group leader is the node closest to the center of the group
- Suggests various techniques for signing messages as a group
  - » combined signatures
  - » onion signatures
  - » hybrid (combined/onion) signatures
- Simulation using ns-2
  - » scenario is city environment
  - » low density, constant speed
- Metrics: number of broadcasted messages, delay

Round 3 - Wrap-Up

Lightweight Information Dissemination

- Uses a message propagation function to determine how to disseminate messages
  - » function indicates destination area as well as preferred route
- Goal is to reach emergency stations as well as nearby intersecting roads
- Suggests various protocols
  - » one zero flooding
  - » distance-driven probabilistic diffusion
  - » function-driven probabilistic diffusion
  - » feedback-augmented store and forward diffusion
- Simulation using J-Sim
  - » city environment (Manhattan model)
- Measured number of messages propagated towards destination (away from accident) and number of messages propagated behind accident