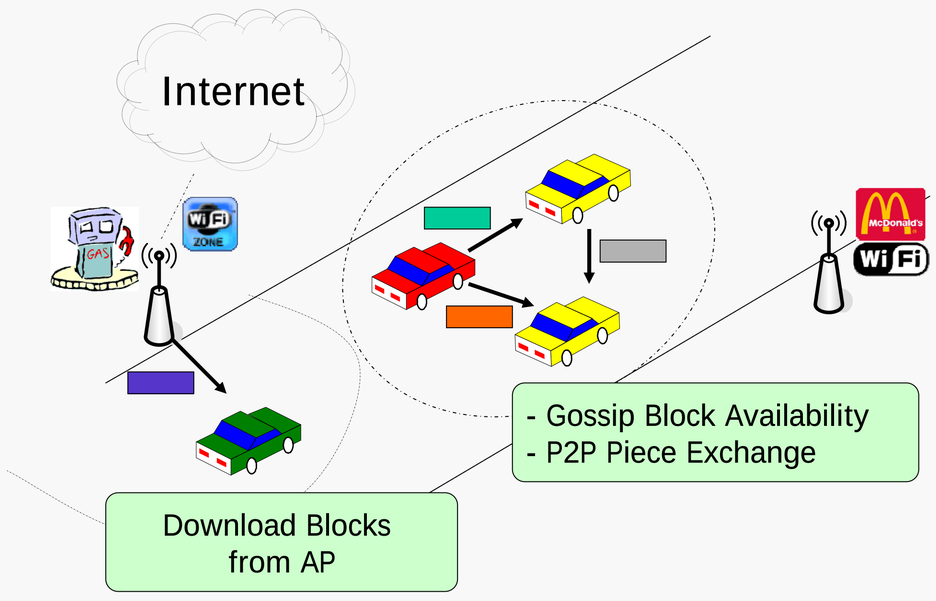
First Experience with CarTorrent in a Real Vehicular Ad Hoc Network Testbed

Kevin C. Lee, Seung-Hoon Lee, Ryan Cheung*, Uichin Lee , Mario Gerla
Department of Computer Science, University of California, Los Angeles
*{kclee,shlee,uclee,gerla}@cs.ucla.edu, rcheung2@ucla.edu**

Introduction

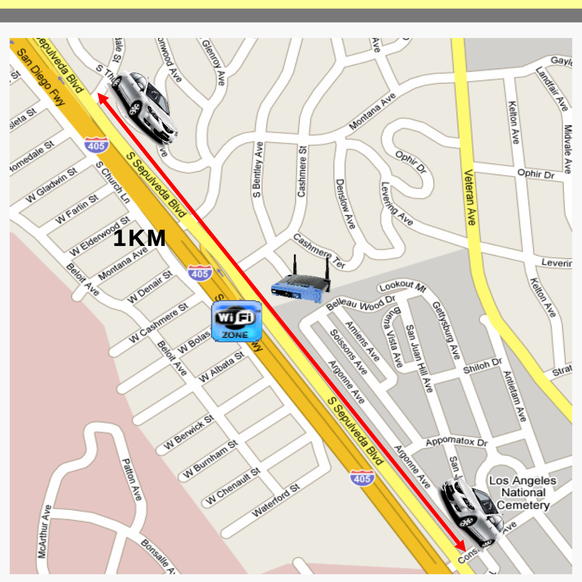
- P2P file sharing is a promising application in in a vehicular ad hoc network (VANET)
  - General multimedia data: e.g., navigation map updates, game s/w, video clips, etc.
  - Location cognizant data: e.g., hotel tour clips, movie trailers nearby theaters
- Incentives P2P file sharing in VANET: the small transmission window, high mobility of vehicles, and intermittent and short-lived connectivity to an access point

CarTorrent Overview



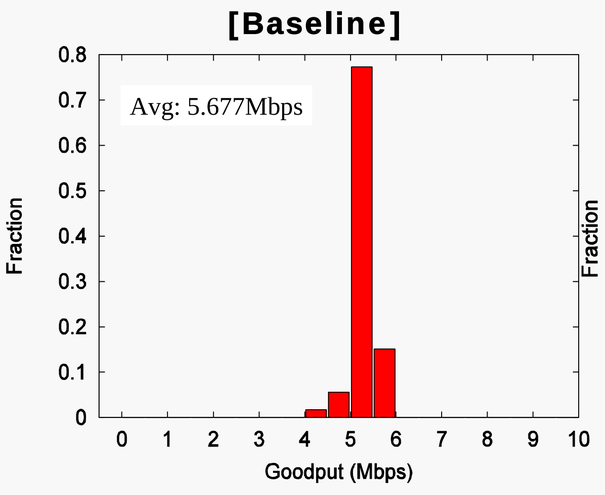
- *BitTorrent*-like file swarming: a file is divided into *k* equal size blocks
- Gossiping:
  - Block availability info dissemination
  - Neighbor management
- Block selection based on rarest (peer count) closest (hop count)
- Multi-hop pulling via AODV as an underlying routing protocol

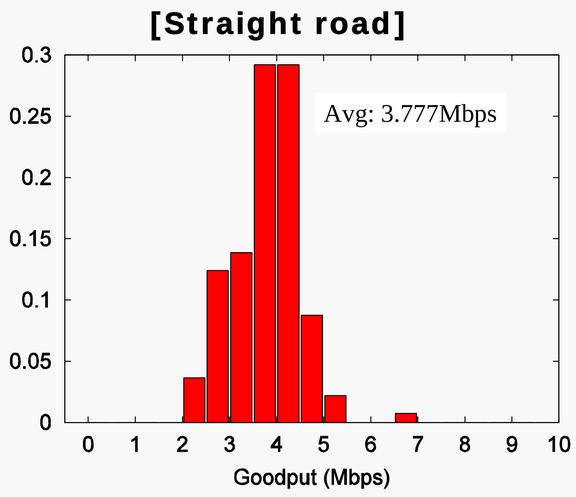
Experiments



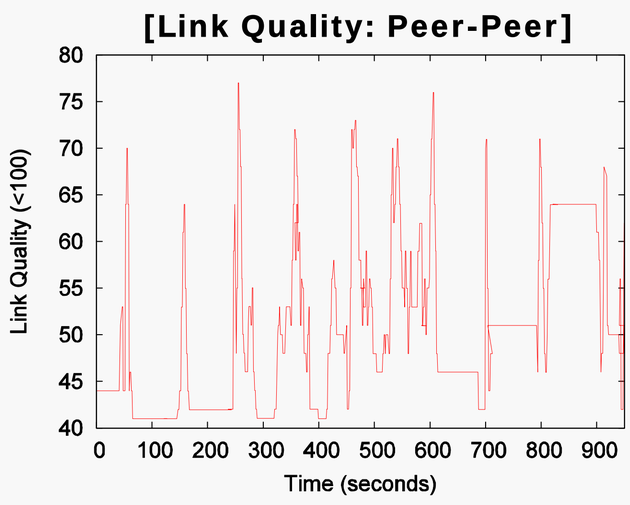
- Setup
  - Vehicle carries a laptop with two 802.11b interface cards
  - One connects to the AP; the other to peers
- Two scenarios:
  - Baseline: one laptop to another in a parking lot
  - Straight road: two vehicles in a straight road (AP in the middle)

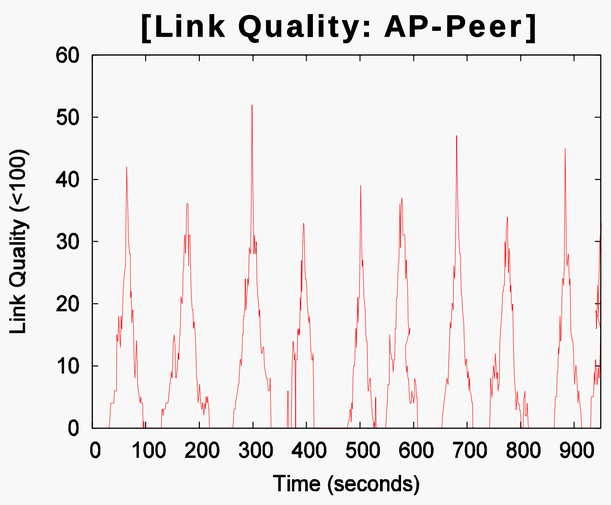
Experimental Results

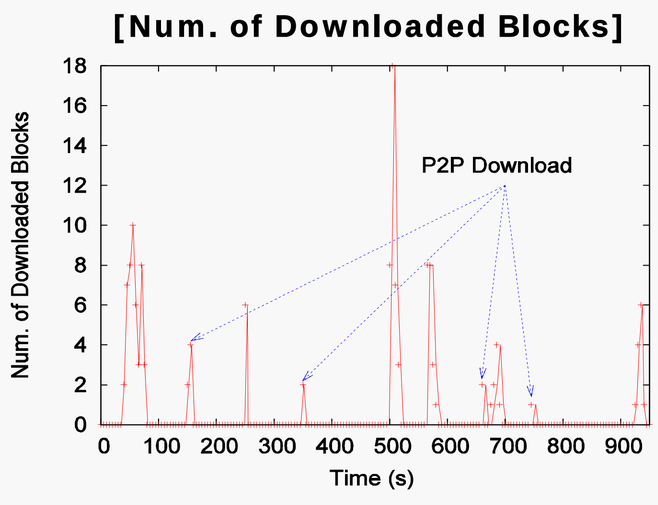




- Per block goodput distribution with 128KB block size
- Straight road scenario has:
  - 34% goodput loss due to mobility
  - Larger deviation than baseline







- [40s, 70s] & [520s, 600s]: Blocks downloaded from AP not peer (i.e., AP is more preferable for downloading)
- [790s, 810s] and [890s, 910s]: Good link quality between peers but no download ➔ Peers own same pieces
  - Coding-based techniques (e.g., Network Coding) can potentially improve the performance
- [300s, 400s]: Good link quality between the peer and AP but no download ➔ "Capture effect"

NETWORK RESEARCH LAB. Computer Science Dept. UCLA