ConMap: Optimizing Multicast Energy in Delay-constrained Mobile Wireless Networks

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September 16, 2016

Outline

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Background

- The project started in September, 2015.
- We first submitted the paper to ACM MobiHoc 2016.
- The joint optimization of transmitting and receiving energy was inspired by discussion with Prof. Ness B. Shroff.

Motivations and Contributions

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  - (i) Energy saving is becoming more and more crucial.
  - (ii) Multicast is an efficient traffic pattern.
  - (iii) Previous works on multicast energy optimization only considered transmitting energy and are limited to static or wired networks.

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- Contributions
  - (i) Investigate the complexity of minimum energy multicast in mobile wireless networks.
  - (ii) Propose a general optimization framework that jointly optimizes transmitting and receiving energy.

Challenges

- Dynamic topology of the networks.
- "Wireless Broadcast Advantage"
- Heterogeneity between transmitting and receiving energy.

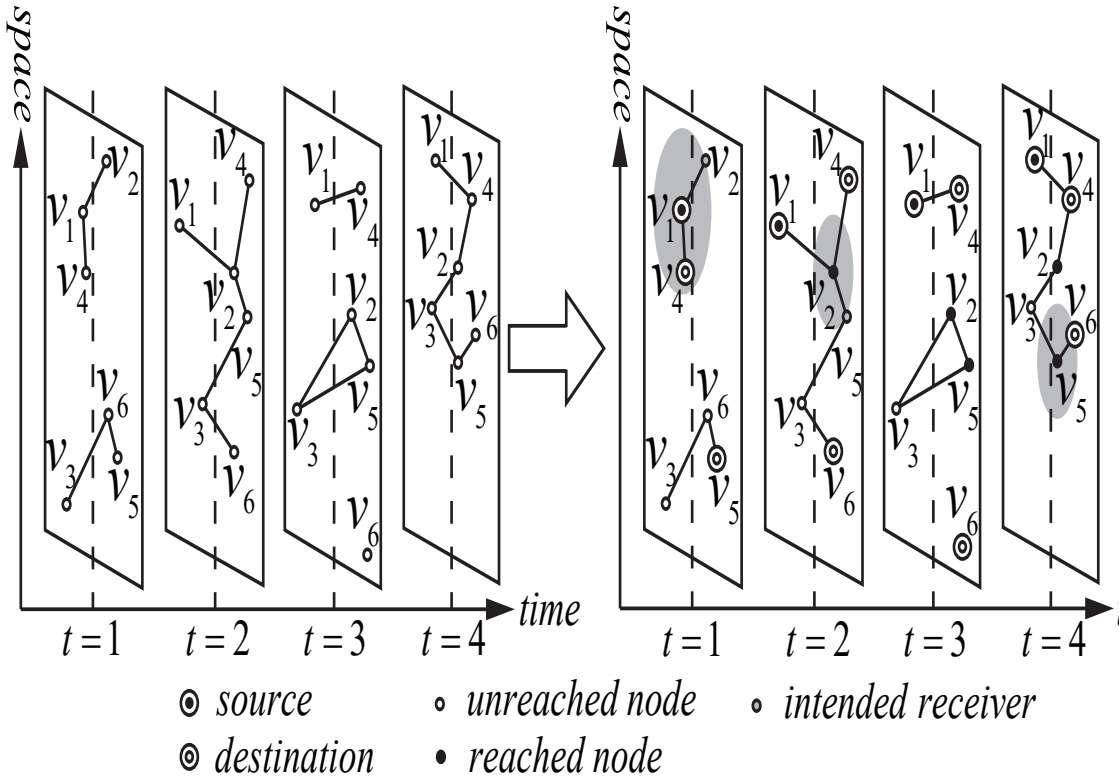

Illustration of the Challenges

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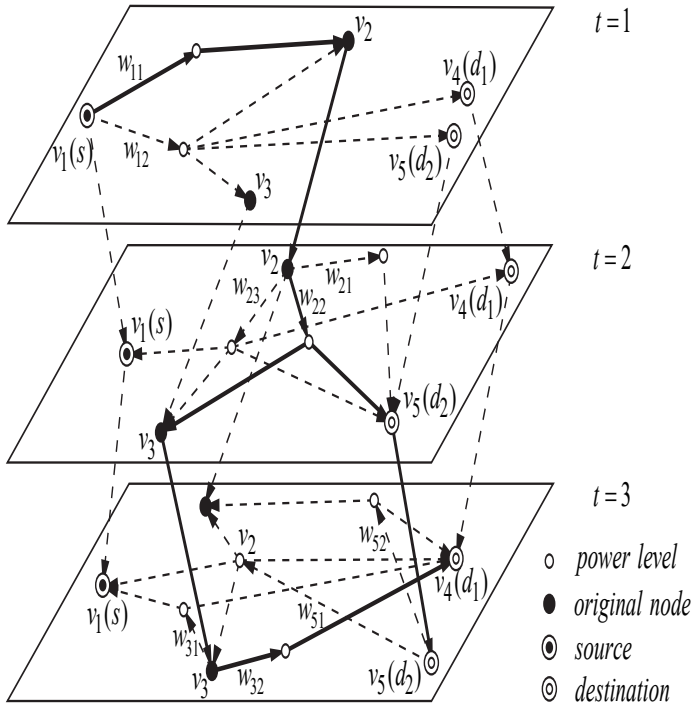
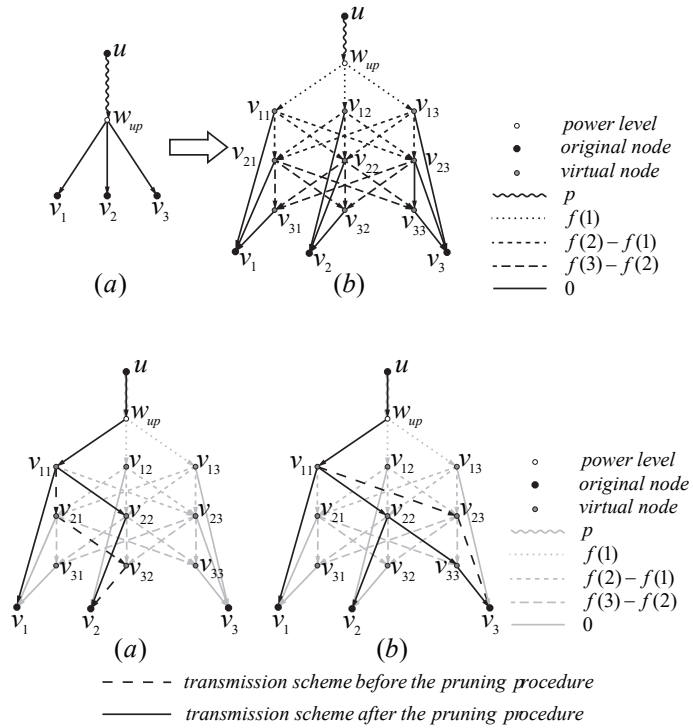
  - (ii) The energy consumption of transmission schemes.
- Proved that it cannot be approximated better than a logarithmic factor.
  - (i) The proof is done by polynomial time reduction from acyclic directed Steiner tree problem.
  - (ii) The reduction is approximation preserving.

The Optimization Framework – ConMap

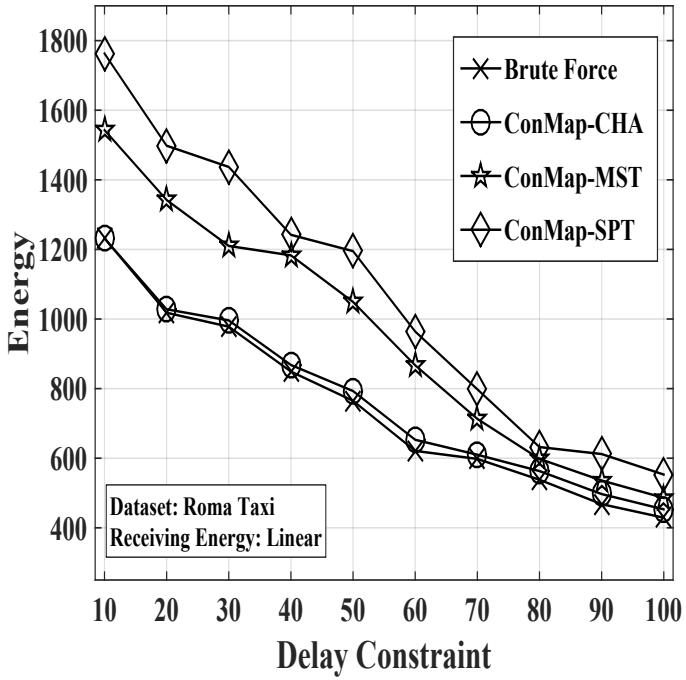
Central idea: Using graph gadgets to capture energy consumption.

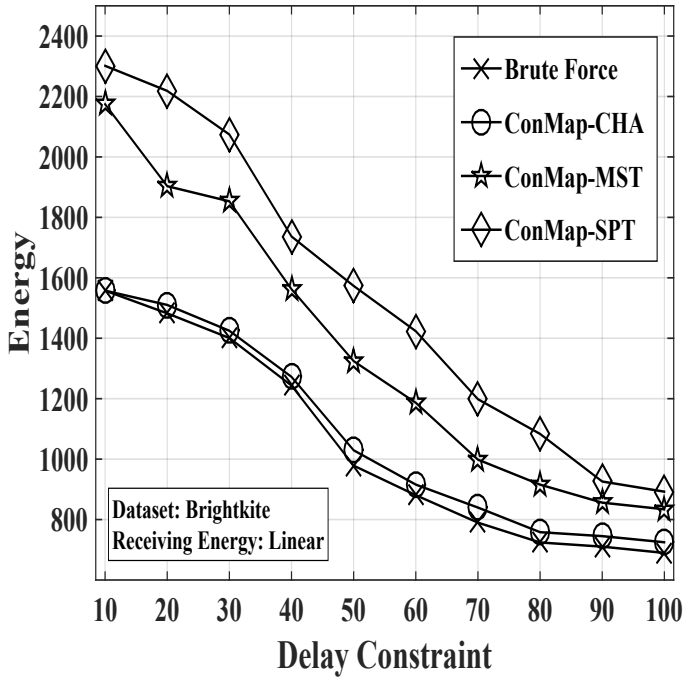




Simulations

We carried out simulations on Roma taxi dataset and Brightkite social network dataset.





Thank You!