OPTIMAL MULTICAST CAPACITY AND DELAY TRADEOFFS IN MANETS

Abstract:

In this paper, we give a global perspective of multicast capacity and delay analysis in Mobile Ad Hoc Networks (MANETs). Specifically, we consider four node mobility models: (1) two-dimensional i.i.d. mobility, (2) two-dimensional hybrid random walk, (3) one-dimensional i.i.d. mobility, and (4) one-dimensional hybrid random walk. Two mobility time-scales are investigated in this paper: (i) Fast mobility where node mobility is at the same time-scale as data transmissions; (ii) Slow mobility where node mobility is assumed to occur at a much slower time-scale than data transmissions. Given a delay constraint D, we first characterize the optimal multicast capacity for each of the eight types of mobility models, and then we develop a scheme that can achieve a capacity-delay tradeoff close to the upper bound up to a logarithmic factor. In addition, we also study heterogeneous networks with infrastructure support.

Existing system:

Many works have been conducted to investigate the improvement by introducing different kinds of mobility into the network. Other works attempt to improve capacity by introducing base stations as infrastructure support. As the demand of information sharing increases rapidly, multicast flows are expected to be predominant in many of the emerging applications, such as the order delivery in battlefield networks and wireless video conferences. Related works are including static, mobile and hybrid networks.

Introducing mobility into the multicast traffic pattern, Hu et al. studied a motion cast model. Fast mobility was assumed. Capacity and delay were calculated under two particular algorithms, and the tradeoff derived from them. In their work, the network is partitioned into cells similar to TDMA scheme is used to avoid interference. Zhou and Ying also studied the fast mobility model and provided an optimal tradeoff under their network assumptions.
Proposed system:

In this paper, we give a general analysis on the optimal multicast capacity-delay tradeoffs in both homogeneous and heterogeneous MANETs. We assume a mobile wireless network that consists of n nodes, among which n_s nodes are selected as sources and n_d destined nodes are chosen for each. Thus, n_s multicast sessions are formed. Our results in homogeneous network are further used to study the heterogeneous network, where m = n^\beta base stations connected with wires are uniformly distributed in the unit square. The purpose of this paper is to conduct extensive analysis on the multicast capacity-delay tradeoff in mobile wireless networks. We study a variety of mobility models which are also widely adopted in previous works. The results obtained may provide valuable insights on how multicast will affect the network performance compared to unicast networks. By removing some limitations and constraints, we try to present a fundamental and more general result than previous works.

Advantages of proposed system:

- In homogeneous networks, we established the upper bound on the optimal multicast capacity-delay tradeoffs under two-dimensional/one-dimensional i.i.d./hybrid random walk fast/slow mobility models and proposed capacity achieving schemes to achieve capacity close to the upper bound.
- We find that though the one dimensional mobility model constrains the direction of nodes’ mobility, it achieves larger capacity than the two dimensional model since it is more predictable.
- Also, slow mobility brings better performance than fast mobility because there are more possible routing schemes.
System configuration:

Hardware requirements:

✓ Processor - Pentium –IV
✓ Speed - 1.1 Ghz
✓ RAM - 512 MB(min)
✓ Hard Disk - 40 GB
✓ Key Board - Standard Windows Keyboard
✓ Mouse - Two or Three Button Mouse
✓ Monitor - LCD/LED

Software requirements:

❖ Operating System : LINUX
❖ Tool : Network Simulator-2
❖ Front End : OTCL (Object Oriented Tool Command Language)

Reference:

Jinbei Zhang, Xinbing Wang, Senior Member, IEEE , Xiaohua Tian, Member, IEEE Yun Wang, Xiaoyu Chu, and Yu Cheng, Senior Member, IEEE “Optimal Multicast Capacity and Delay Tradeoffs in MANETs” - IEEE TRANSACTIONS ON MOBILE COMPUTING VOL:PP NO:99 2013