CS4331/5331: Wireless Networks and Mobile Computing

Fall 2021

Write a ONE-PAGE (10 font size and single space) summary using your own words:

• Homework number: 6

• Paper title: RandomCast: An Energy-Efficient Communication Scheme for Mobile ad Hoc Networks

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Summary

An ad hoc network is a set of mobile end users forming a local network and each device working as a host, this mechanism offers convenient communication between many mobile devices without having a centralized organizer or infrastructure. One concern with the ad hoc network is the balance between routing performance and power-saving efficiency, because for pathfinding while transmitting data between nodes, the overhearing may cost extra energy, which obeys the purpose of power-saving. On the other hand, if no overhearing is allowed in an ad hoc network, the routing protocol will not work properly. In this paper, the authors propose a new communication mechanism called RandomCast which can determine the desired level of overhearing in order to find a balance between overhearing for routing and power-saving.

Major Contribution

This paper proposed a communication mechanism to make the 802.11 PSM applicable in an ad hoc network with DSR and to save extra energy by identifying and eliminating unnecessary communication activities. This paper also identifies four major factors that may affect overhearing and rebroadcast decisions, which are sender ID, number of neighbors, mobility, and remaining battery energy. The major contribution of this paper may be concluded as three aspects. First, the RandomCast protocol is designed to employ the 802.11 PSM in multihop ad hoc networks. Nodes work under RandomCast will stay at Power Saving Mode rather than switching between Active Mode and Power Saving Mode. Second, In RandomCast, a transmitter will determine the desired level of overhearing in order to find a balance between energy and throughput, this may also avoid semantic discrepancy found in many other ad hoc network routing protocols. Finally, the RandomCast can handle unconditional forwarding packets. This is to avoid redundant rebroadcasts of the same packet in dense mobile networks. In overhearing, different broadcast packets are treated differently. The key design in RandomCast implementation is randomization, the authors illustrated a way to determine the level of overhearing by RandomCast probability, and the analysis shows that the RandomCast mechanism could enhance energy performance without hurting the equality of route information gathered from overhearing.

Weak Aspects

The weak aspect of this paper is the RandomCast mechanism is a dedicated design that tries to find a balance between routing performance and power-saving, it is mainly tested in an ideal environment. The author did not mention any security issues related to this protocol, and design. In reality, the security problem could be a crucial part and any modification related to the security issue could lead to performance problems.