

Abstract

In routing, the problem of performing minimum energy multicast considering Wireless Multicast Advantage (WMA) is difficult. This is because, the problem of minimum energy broadcast that is solved easily in the wireline case by various minimum weight spanning tree algorithms, becomes NP-complete. However, alternative approach using heuristics method is employed. An example of this method is the Multicast Incremental Power (MIP) algorithm. The coding technique has further simplified the problem of minimum energy multicast. This is achieved by solving the problem of minimum energy multicast in polynomial time. As a result, optimal energy is less when coding is used compared to routing technique. Hence, coding in packet networks (network coding) is a promising approach for minimum energy multicast. Simulation results have shown that coding can reduce between 13% to 49% average total multicast energy in random wireless networks of varying size over MIP technique. Therefore, in terms of reducing the multicast energy, coded packet technique outperformed the MIP technique. Furthermore, it was observed that polynomial-time solution is not enough to address the problem of minimum energy multicast. This is because, the solution was based on centralised computation, which is not suitable for many applications. As a result, a decentralised solution was proposed for optimisation in network coding. However, there is a need to further reduce the multicast energy in coded packet networks using appropriate model. This study reveals that though various solutions were proposed for minimum energy multicast but, they did not address the efficiency of the networks adequately. This rendered both the centralised and decentralised coding techniques.

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