RELIABLE BROADCASTING IN AD HOC WIRELESS NETWORKS WITH MAC MINI-SLOTS AND DIRECTIONAL ANTENNAS

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ABSTRACT. *Ad hoc wireless networks prevail in situations where infrastructure is not available. Reliable broadcasting is essential to ad hoc wireless networks for administrative reasons. However, the task is far from trivial due to the high bit error rate inherent in wireless environment. Aimed at higher reliability in broadcasting for ad hoc wireless networks, an innovative broadcasting scheme is developed and presented in this article. Featuring mini-slots at the MAC layer and directional antennas for NACK signal forwarding and transmission, the proposed scheme outperforms previous approaches in terms of packet loss recovery time, overhead, and throughput. A series of simulations was conducted to verify the effectiveness and efficiency of the proposed scheme, and optimistic results were obtained as expected.*
Keywords: Ad hoc wireless network, Reliable broadcasting, MAC layer, Directional antenna

1. **Introduction.** There are two main mainstreams of wireless local area networks, namely WLAN with infrastructure and ad hoc wireless networks. With the coordination of access points, WLAN with infrastructure is, in general, regarded as an extension to wired networks, and is intended to get rid of the tangling of network cables. Without the need for a central coordinating node, an ad hoc network is formed spontaneously by its participant nodes. This unique operation mode makes ad hoc wireless networks play their roles in circumstances when infrastructure is not possible, such as battlefields and scenes of rescue [1].

Constituent nodes within an ad hoc wireless network communicate with each other directly. The communication can be done in either single-hop direct transmission or multi-hop routing and forwarding with the help of other nodes. This implies that it is essential for all nodes to be aware of the entire topology of the network. There are many tasks with broadcasting of administrative information as their basic building blocks, such as routing [2,3], energy-saving [4], clustering [5], and others. The exchange of topological and other administrative information can be efficiently done via broadcasting, provided