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Critical Review of "Does the IEEE 802.11 MAC Protocol Work Well in Multihop Wireless Ad Hoc Networks?"

The paper attempts to investigate whether the IEEE 802.11 MAC protocol functions well in multihop networks by presenting several difficulties encountered in an IEEE 802.11-based multihop network and exploring the underlying cause(s) of these problems. By using simulations using the NS2 network simulator, Xu and Saadawi explore and address the problems that an IEEE 802.11-based multihop wireless networks and propose possible solutions to these problems. After identifying that the MAC layer is the cause of the hidden and exposed node problems and that the interaction between the TCP and MAC layers backoff timers is also the cause of severe unfairness prevalent in multihop networks, the paper provides a potential solution in the form of a yield time scheme (to address the unfairness problem in 802.11) with the caveat that the proposed scheme will cause the aggregated throughput to degrade terribly; besides altering the backoff policy (and making the backoff policies fairer), adjusting the interfering (and sensing) range may prove to be a useful solution in attempting to resolve the exposed node problems (quality of service schemes, in particular, could address some of these problems but not eliminate them entirely). At the conclusion of their experiments, however, Xu and Saadawi arrive at the conclusion that while the IEEE 802.11 MAC protocol can support some kind of ad hoc network architecture, it is not suitable for multihop networks, as the MAC layer problem can cause the routing protocol to fail. I agree with the paper's conclusion that the current version of this wireless LAN protocol does not function well in multihop ad hoc networks because from the experiments outlined in this paper, it is evident that the TCP connection enlarges and intensifies the problems in the MAC layer. In other words, even if we do not use TCP, the problems still exist in the MAC layer when IEEE 802.11 is used in multihop networks. TCP traffic shows the problems existing in the MAC layer very clearly. In fact, these problems appear when the traffic load becomes large enough, even if the traffic is not from TCP. From the results of the paper's experiments, it is apparent that the current version of this wireless LAN protocol does not function well in multihop ad hoc networks, which causes me to wonder how the current version of the wireless LAN could be modified to make it more applicable to multihop wireless ad hoc networks; I know the paper proposed a few solutions, but I wonder how the issues regarding the backoff policy and the issues regarding the exposed node problems could be further investigated to ensure that these problems do not happen in multihop networks. I was quite unaware of how poorly IEEE 802.11 MAC protocol generalizes to multihop networks considering that the MAC protocol is pretty adaptable.