

In shared-medium wireless networks, nodes contend for medium access in space, time and channel bandwidth. Uncontrolled competition for limited network resources causes severe packet collisions and compounds network congestion. Consequently, data transmission is subject to very long delay, significant packet loss and poor throughput. This work focuses on improving data transmission in wireless ad hoc networks through optimal control of spatial, temporal and bandwidth contention. Our simulation study demonstrates that this optimal control scheme outperforms RTS/CTS and achieves significant improvement of CSMA/CA performance under various effects.