

3. Manikanden Balakrishnan, Hong Huang, Satyajayant Misra, Rafael Asorey-Cacheda, Yousef Jaradat, Sandeep Pawar: 'Null Frequency Jamming of Dynamic Routing in Wireless Ad Hoc Networks'. GLOBECOM 2011: 1-5.

Abstarct:

Distributed network protocols operate similar to periodic state machines, utilizing internal states and timers, for network coordination. This creates opportunities for carefully engineered radio jamming to target the protocol operating periods and disrupt network communications. Such periodic attacks targeting specific protocol period/frequency of operation is referred to as Null Frequency Jamming (NFJ). In this paper, we investigate NFJ targeted at the on-demand route recovery procedure, which is a crucial functionality for ad-hoc network operation. We use DSR as the example routing protocol. Our mathematical analysis and simulation results show substantial degradation in network throughput at certain null frequencies, where the jamming periodicity self-synchronizes with the route recovery cycle. Using simulations, we also demonstrate an effective countermeasure, randomized route-recovery periods, for eliminating the presence of predictable null frequencies and mitigating the impact of NFJ.