Abstract

Wireless sensor networks (WSNs) are extremely vulnerable to jamming attacks as they are abjectly poor in resources. However, WSNs have immense synergy owing to their high network density, inexpensiveness, and deployment-flexibility. This research is aimed at utilizing this synergy to strengthen WSNs against jamming. The aim has been pursued by solving the problems of: 1) jamming detection, 2) jammed area mapping, 3) jammer localization, and 2) jammer tracking.

The work on jamming attack detection for WSNs tackles the problem through 'fuzzy inference system' for jamming-quantification and '2-Means clustering of node-neighborhood system' for jamming-confirmation.

Jammed area mapping is done by drawing desired number of zones through hull tracing of jammed nodes as per their pre-calculated jamming indices.

Two accurate and versatile methods for jammer localization are formulated – 1) 'Spoke' and 2) 'Weighted Centroid Method with Jamming-Index as Weight.' These are based on the principles of 'electro-magnetic waves following the rectilinear inverse square law of propagation' and 'prevalent jamming effects' respectively.

Having detected the current location of the jammer, the tracking system tracks the jammer in three stages. First it computes the next likely victim target area in the WSN. Then it forecasts the prospective location from where the jammer would operate next. Finally, it plots the jammer's likely route from the current location to the forecasted location.

Keywords: Wireless sensor networks, jamming detection, jammed area mapping, jammer localization, jammer tracking.