

Swarm Autonomous Routing Algorithms

Swarm Routing Algorithm Opens Scalable Ways to Connect Battlefield or Emergency Communication Networks



Technology and Innovation

With the advent of portable computing and wireless communication, there has been increased attention to military and civilian applications for mobile ad hoc networks (MANETs) — infrastructureless, dynamic networks, formed spontaneously by wireless mobile nodes that communicate directly through each other. Most existing MANETs have performance shortcomings because their standards and routing protocols are based on those of wired and small, non-moving wireless networks. Therefore, they do not deal well with mobility, change, or the absence of a fixed network structure.

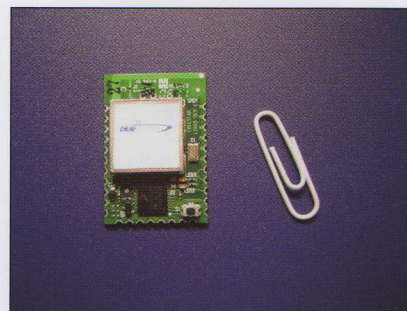
With DARPA SBIR support, along with matching funds from the U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC), Bluetronix has developed a simple, reliable solution to a nagging challenge, Swarm Autonomous Routing Algorithm (SARA), to address shortcomings in MANETs. SARA's unique approach uses local data with neither a center point of control nor routing tables. By executing in a purely autonomous, distributed manner, SARA enables scalability to tens of thousands of nodes in a network, rapid initialization, and greater network efficiency. Bluetronix swarm differs from other approaches in that it needs no prior knowledge, learns as it communicates, is distributed in nature,

and uses no access points, control points or routing tables.

With the swarm autonomous routing, MANETs offer many potential advantages over infrastructure-based networks. For example:

- They self-organize, so they require no setup or configuration.
- They are efficient, using minimal battery power to handle large volumes of data quickly without routing tables.
- They are flexible (able to handle a dynamic topography), adaptable (able to handle nodes joining and leaving the network), scalable (able to handle increasing and decreasing numbers of nodes without modification), mobility capable (able to handle mobility and high speeds) and robust (able to withstand losses and continue functioning effectively).
- They heal quickly through self-reorganization.

Current and future uses of MANETs include battlefield communications, on-site disaster relief management (particularly in areas where the existing communications infrastructure has been destroyed), low-cost relay points for Cellular and WiFi, and sensor networks to enhance homeland security. An 8-bit stamp-sized module for sensor networks



The ant-inspired Swarm Autonomous Routing Algorithm is built into Bluetronix's 802.15.4 swarm module.