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Setting limits for cognitive radio networks

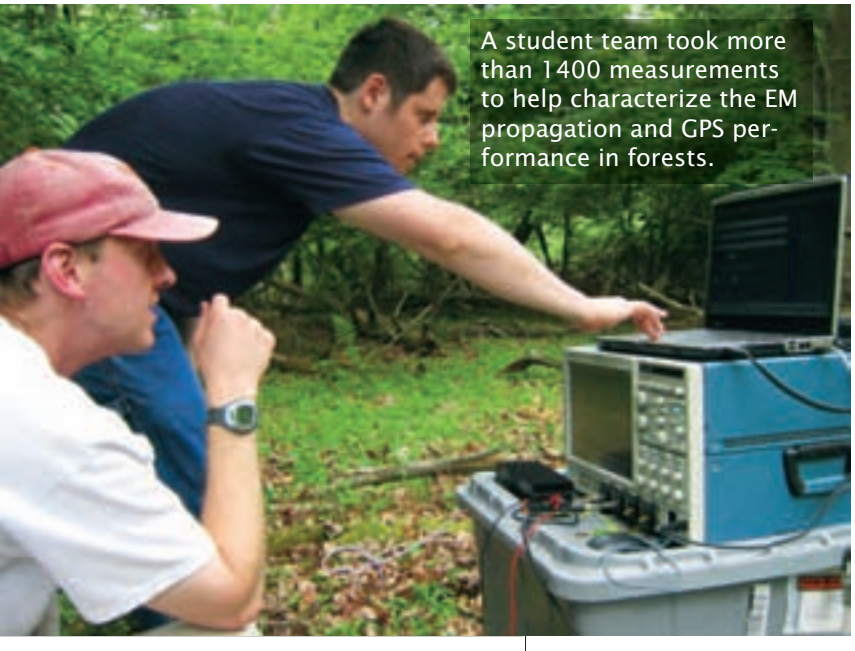
Many researchers expect that as cognitive radio (CR) technology matures, it will play a pivotal role in wireless mesh and ad hoc networks, according to Tom Hou, an associate professor of ECE.

"Due to its unique characteristics in spectrum usage, a CR network differs significantly from the existing multi-channel, multi-radio network," he says. He was recently awarded a two-year grant from the National Science Foundation NeTS program to develop network theoretical bounds and performance limits for future CR networks. "Such efforts are not only of theoretical interest, but also offer fundamental understanding of the potential and limits of such networks, as well as provide performance benchmarks for the design and evaluation of distributed algorithms and protocols."

Networks for the GPS-challenged

A single receiver in a dense forest does not get enough information to determine its location using the GPS system, which requires a lock on four different satellites. Obstructions in the forest (trees to most people) typically prevent receivers from communicating with more than one or two satellites at any single time.

A Wireless@VT effort, headed by Michael Buehrer, an associate ECE professor, is developing outdoor sensor network technology that enables receivers to share GPS information and determine their own location. Nodes will share their limited GPS information to calculate a known coordinate for at least one node in the network. By range-finding between themselves, the nodes will know each other's relative location and be able to precisely compute the latitude and longitude for each node.



A student team took more than 1400 measurements to help characterize the EM propagation and GPS performance in forests.

In an effort to characterize the EM propagation and GPS performance in forest environments, a team of graduate and undergraduate students measured 93 different locations in four different forest environments. More than 1400 measurements were recorded in light brush and light, medium, and dense forest situations.

The undergraduates were funded under the National Science Foundation (NSF) Research Experience for Undergraduates (REU) program. Undergraduate students involved were Alyse Bowers, Kyle Forrester, Chris Hutchens, Jason McKillican, and Brian Sarbin. Their work was presented in a paper at the 2008 IEEE Wireless Communications and Networking Conference.

The team was led by postdoctoral research faculty member Chris Anderson and a graduate student team of Haris Volos, Bradley Fellow Chris Headley, and Tao Jia. Anderson is now an assistant professor of ECE at the United States Naval Academy.