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Solitary cell phone users may find that there is
Strength in Numbers

Associate Professor Yuguang Fang

Wireless devices – cell phones, PDAs, and the like – seem to be ubiquitous these days. But gaps in the infrastructure and competing technologies mean that wireless communications aren't as effective as they might be. Electrical engineer Yuguang (Michael) Fang is researching ways to boost and enhance wireless services.

Fang, an associate professor in Electrical & Computer Engineering, has received the prestigious National Science Foundation CAREER Award to work on intelligent resource management and integrated services for wireless mobile networks.

The problem, Fang says, is that all the different wireless technologies overlap, but don't work together in harmony. The differences in the technologies create bottlenecks in providing seamless wireless services to users on the move. Intelligent resource management in the wireless mobile networks has become a critical issue. Fang and his students are developing intelligent resource allocation schemes by taking user mobility information and resource availability into consideration so that the best services can be provided.

One solution, he says, is to gang up cell phones and other devices so they work together. In a wireless network, multiple communications devices in close proximity form a natural distributed antenna array. If nearby devices transmit and receive signals in a cooperative manner, then the system performance can be significantly improved.

The key is knowing where the devices are relative to each other. Like all devices that transmit radiowaves, mobile phones can be tracked. If a group of mobile phone users can be shown to move around in a predictable manner near a base station, the network signals coming through the base station can be allocated among the group members to overcome weak areas.

The ability to boost signals would be important in military situations like Iraq, where there is no infrastructure and a hostile environment, Fang says. Fang has received a highly competitive Young Investigator Award from the Office of Naval Research to develop a framework for network protocols for tactical military applications. The goal is to develop a device and energy