Virtual Router for a Robust Wireless Multi-hop Highly Mobile Communication Network

Advantages
• Robust data communication even within high mobility environments
• Less expensive to operate and maintain

Invention
The invention represents a method for forming and maintaining wireless communication routes between a source node and a destination node by means of relay nodes and mobile nodes. Performance of networks are unaffected by the mobility of such nodes.

Background
Mobile wireless networks exist in two variations: those with infrastructure and those without (also known as mobile ad-hoc networks (MANETs)). The mobile ad-hoc network has no fixed physical routers (infrastructure); instead, the mobile nodes (cell phones, notebook computers, etc.) function as relay points or routers, which discover and maintain communication connections between the source nodes and the destination nodes. Thus, MANETs are a self-organizing multi-hop wireless network in which all nodes take part in the routing and data forwarding process. MANETs support mobile applications where an infrastructure is either not available (e.g. rescue operations) or not desirable (e.g. harsh environments).

Maintaining communication links between mobile nodes is difficult in multi-hop wireless networks. Movement of the mobile nodes can cause excessive delays and substantial overhead. Current MANET designs establish a new communication route each time a failure occurs. Current techniques, such as the rerouting approach (which repeatedly reestablishes new communication routes), are ineffective for video and audio communications since they suffer from serious data transmission delays. The Global Positioning System (GPS) approach does not work in environments where GPS is not available (e.g. indoors) and also requires extra hardware (e.g. receivers on every mobile node). UCF engineers have discovered a more robust method of mitigating these challenges by way of virtual routers. This virtual router is associated with a particular geographical area whose functionality is provided by the physical nodes (i.e., mobile devices) currently within the geographical region of the virtual router, thereby enabling a more efficient transmission of data.

Application
The technology can be utilized for vehicle-to-vehicle communications, mobile wireless gaming, municipal mesh networks, high-mobility sensor networks and many other military applications where a conventional infrastructure is not available. Communication network companies, mobile device manufacturers, software application companies, vehicle manufacturers and the military may be interested in this technology to increase the capabilities and performance of their current mobile networks.

Lead Inventor
Kien A. Hua Ph.D.

Selected References

Contact: Andrea Adkins; University of Central Florida; Office of Research and Commercialization, 12201 Research Parkway, Suite 202, Orlando, FL 32826-3246; Phone: (407) 823-0138; Fax: (407) 882-9010; Aadkins@mail.ucf.edu; IP # 7354