

Virginia Tech electrical engineers invent wireless Internet connection

August 3 2005

A new unlicensed, wireless Internet connection, WiFi, is providing new freedom to the World Wide Web addict.

An antenna for WiFi, invented by Warren Stutzman of Virginia Tech's Bradley Department of Electrical and Computer Engineering and his Ph.D. post-graduate researcher Michael Barts, allows users to receive signals in remote locations such as airports and hotels to log on to the Web.

"The stub-loaded helix antenna has expanded both our company's reach and that of wireless technology," said StayOnline Chief Operating Officer Steve Berrey. "It has truly been the key to our success because of its non-linear polarization properties that virtually eliminate all 'dead spots' in a wireless network. This has greatly enhanced StayOnline's competitive edge in the industry. StayOnline's clients – primarily hospitality providers – are consistently awed by the stability of their wireless signal and the low drop-out rate they and their guests experience."

Stutzman and Barts of the Virginia Tech Antenna Group (VTAG) started investigating this unique helix antenna more than 10 years ago. In 1994, Virginia's Center for Innovative Technology (CIT) partially funded VTAG to examine a type of helix antenna that a scientific journal reported to be very small with high-performance.

Although they were not able to verify the results for this specific antenna, their effort enticed them to investigate other size-reduced helix

antennas. A helix antenna resembles a bedspring and has been in wide use for many communications applications. The helix antenna is unique because it produces circular polarization, whereas most communications antennas use linear polarization, and it has high gain for its size.

Stutzman and Barts tried many new helix antenna design concepts. They bent lots of wire in unusual shapes, and then tested them for antenna performance. "One geometric form proved to hold the secret to success," Stutzman said. "We modified the helix windings to have hairpin type bends internal to the surface of the conventional helix. This essentially fools the helix into thinking it is larger than it really is. The net result was an antenna that occupies 70 percent less volume than the conventional helix. This was the first major improvement to the helix antenna since it was invented over 50 years ago."

Through the Virginia Tech Intellectual Properties (VTIP), they applied for a patent that was awarded in 1999. VTIP agreed to license the antenna to one of the earliest wireless Internet equipment companies, Turbowave in Utah. Turbowave sponsored additional VTAG research to refine the antenna. Afterward, Turbowave deployed wireless Internet in large areas in Orem and Provo, Utah.

FRC Corp in Mason City, Iowa, became the manufacturer of the antenna. Mohamed Raji, director of global program management with FRC Component Products Inc., said his company, "an established leader in the avionics antenna industry...quickly realized the great potential and future of broadband wireless. FRC became the exclusive licensee of the VTIP SLH antenna products, which are the best performing 2.5 GHz range antennas in the field today. Product sales are growing and we have geared up production to 1 million antennas per year."

Today, the antenna is used for difficult applications where long distances or building penetration is needed. The two major application areas for

the antenna are wireless metropolitan area networks such as cities and hotels where StayOnline is very popular. The antenna is now deployed in several major U.S. cities such as Salt Lake City, Denver, and Phoenix, and it also can be found in New Zealand. Hundreds of hotels in the U.S. use the antenna. Patents for the antenna are awarded or pending in 16 countries, including the U.S., seven European countries, China, and Australia.

One hotel chain, Davidson, uses StayOnline of Atlanta as its primary vendor for WiFi networks. Ron Hardin of Davidson Hotels who has been in charge of deploying more than 20 hotel WiFi networks added that the SLH antenna has had a positive impact "on our ability to install and operate well-performing, cost effective WiFi networks."

RoamAD Limited, a New Zealand-based company, has been at the forefront of the growing metro WiFi market since it deployed the world's first metro WiFi network in August 2002. It is the leading supplier of software for mobile VoIP/VoWiFi enabled metro WiFi networks, highway WiFi networks, and campus hot zones.

"A number of RoamAD customers have used the SLH antenna together with RoamAD's software platform and hardware reference design to create metro WiFi networks that deliver high quality mobile VoIP/VoWiFi. RoamAD has found that for specific applications, the SLH antenna can be an effective part of the overall network solution due to its small form factor and good propagation characteristics," said Brett Telfer, vice president of Operations, RoamAD.

The Blue Zone, one of the leading providers of wireless services in the U.S., is focused on community and metropolitan wide area deployments of broadband wireless infrastructures. Troy Page, its director of operations, said, "The FRC/VTIP SLH antenna design has changed the way we provide wireless service to our customers. Because of the small

size and circular polarization, we have been able to install customers at a much faster rate and with less aesthetic challenges than ever before. The SLH antenna's consistent performance, cost effectiveness, exceptional penetration, and design simplicity continue to exceed our expectations. This is without a doubt the easiest, most stable antenna system we have tested, and we have no hesitation recommending it to users of 2.4 GHz wireless data systems."

Source: Virginia Tech

Citation: Virginia Tech electrical engineers invent wireless Internet connection (2005, August 3) retrieved 3 July 2024 from <https://phys.org/news/2005-08-virginia-tech-electrical-wireless-internet.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.