Software allows neighbors to improve Internet access at no extra cost

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Computer scientists at the University of Illinois at Urbana-Champaign have developed software that enables the sharing of high-speed wireless connections without compromising security or privacy. The software can improve Internet connectivity in residential areas at no additional cost.

"Significantly improved speed and the 'always on' feature of wireless routers have been driving the rapid spread of broadband Internet access in many residential areas," said Haiyun Luo, a professor of computer science at the University of Illinois at Urbana-Champaign. "More than 56 percent of homes in the United States already have Internet access, and more than half of those homes are using Wi-Fi wireless home networks."

A typical residential user accesses his broadband home connection about 12 to 15 hours per week, Luo said. "So, while the Internet connection is always on, most of the time it sits idle." Luo would like to see that idleness put to good use by benefiting other users, and he and graduate student Nathanael Thompson came up with a way to do it.

Luo and Thompson have developed a software framework called PERM (Practical End-host collaborative Residential Multihoming) that allows neighbors to pool their Internet access and thereby improve both performance and resilience.

"PERM exploits the diversity of broadband Internet access in residential areas to improve connectivity in a managed way," Luo said. "Our design

requires no support outside the user's wireless router, and is immediately deployable."

By pooling all available Internet connections, neighbors can enhance their Internet connectivity at no additional cost. That is, if neighbors are willing to share.

"PERM represents a paradigm shift in the Internet user community," Luo said. "Until now, most users have been unwilling to share their wireless connections for fear of losing security and privacy. We offer a solution that ensures mutual benefit, security and privacy."

The sharing of Internet connections is open only to registered users who, in exchange for using connections belonging to others, must offer the use of their own. This "peer-to-peer" sharing concept has enormous potential, with millions of possible nodes, Luo said.

Within PERM, flow-scheduling algorithms select the best connection from those available. In addition, higher performance is achieved by selecting and using multiple connections when appropriate. The software framework also provides a service scheduler, which gives the owner priority over his wireless router and reports any misuse by others.

But the scope of PERM is still limited: Neighbors can only benefit from sharing when they are around each other's homes. The next step is to expand beyond neighborhoods and take collaborative Internet access on the road, literally.

"Wireless routers are necessarily location-based," Luo said. "But the peer-to-peer sharing concept can just as easily be used between cars, or between homes and cars, as between homes. As more users join the system, the more powerful the system will become."

Thompson will present the peer-to-peer Internet sharing concept and flow-scheduling algorithms at the Institute of Electrical and Electronics Engineers INFOCOM 2006 meeting in Barcelona, Spain, April 23-29.

Source: University of Illinois at Urbana-Champaign