Undersea WiFi can be made faster, says researcher

September 3 2007

As the United States and Canada take their first step toward establishing a cabled ocean observatory, a University of Missouri-Rolla researcher is trying to improve the speed of wireless underwater communication.

The same acoustic waves that dolphins and whales use to communicate when they are thousands of miles apart can be used by humans to transmit information wirelessly, says Dr. Rosa Zheng, assistant professor of electrical and computer engineering at UMR. Her research focuses on shallow water communications, a tool needed for environmental monitoring and other efforts. Shallow water communication is faced with additional challenges because signals are affected by waves and reflections off the ocean's top and bottom surfaces.

"The amazing thing about acoustic signals is that the lower the frequency, the farther away it can travel," Zheng explains. "The challenge is that acoustic waves have a very limited bandwidth. Our goal is to achieve very high reliability and a high data rate."

Data transfer rates in current undersea communication systems are usually limited to a few kilobits per second, well below the megabits per second offered by radio frequency wireless communications. Zheng plans to use multi-input, multi-output (MIMO) technology -- a technique that leverages multiple paths and antennas -- to increase the data transfer rate to hundreds of kilobits per second.

"MIMO technology provides some challenges because you're sending

signals at the same time, using the same frequency band," Zheng says. "Theory proves that it's feasible, but we're still trying to figure out how you separate those signals at the receiver."

Zheng and her University of Missouri-Columbia collaborator have received a three-year, $270,000 award from the Office of Naval Research to fund their research.

Source: University of Missouri-Rolla