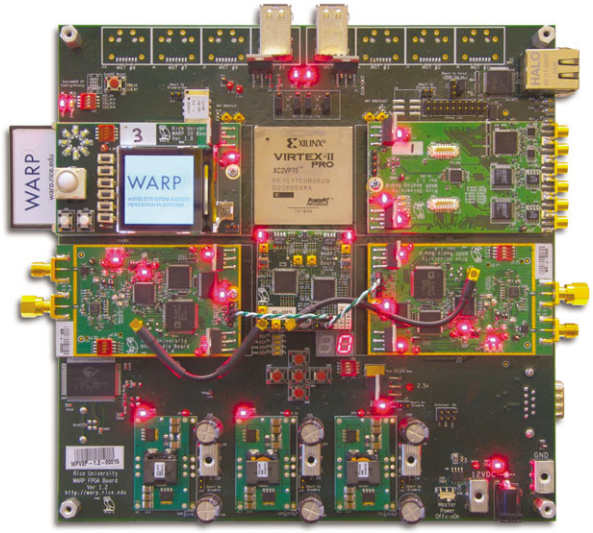
Compiled by Andrew Leibman

# Tech To Watch

## Wireless Open-Access Research Platform




Look up in the sky: It's a bird. It's a plane. It's . . . streaming music, videos, documents, emails, and phone conversations! The unprecedented data access we enjoy today is largely thanks to a proliferation of wireless technologies, from Wi-Fi to Bluetooth to cellular to infrared and more. In fact, many of us would have difficulty imagining life without the omnipresent standards that make our remotes and televisions, smartphones, notebooks, PCs, and gadgets communicate like old friends. But for the most part, the wireless protocols and devices we use today were researched, designed, and created using proprietary test systems that were prohibitively expensive to develop and inherently limited to the tasks that the bankrolling companies and standards organizations set out to tackle. Rice University's WARP (Wireless Open-Access Research Platform) aims to change that, and in so doing, open wireless networking to more creative problem solvers than ever before.

In 2006, a handful of Rice University researchers, led by Ashutosh Sabharwal, set out to create a wireless research platform that was inexpensive, easy to develop on, and freely open to anyone who wanted to use it. The group, part of Rice University's CMC (Center for Multimedia Communication), created WARP as a platform consisting of customizable hardware and communications blocks that enable researchers to modify electrical connections to suit any high-performance wireless communication application as needed. CMC designed the FPGA (Field Programmable Gate Array)-based circuit boards to accommodate multiple analog and digital wideband radios and specialized processors, several I/O (input/output) interfaces for communications with testing hardware and computers, and also included a set of algorithms adept at handling wireless communications. WARP boards are flexible enough that researchers can test multiple radio transmitters, wireless routers, and network access points by writing simple programs that transform the WARP board into whatever device is needed.

Funded with federal dollars from the National Science Foundation, WARP provides interested institutions and organizations with free access to all the hardware specifications, algorithms, and supporting code necessary to get started. WARP kits are available from Mango Communications (mangocomm.com) for commercial and academic users starting at $9,500 and $7,500, respectively.

Nokia, MIT, and Ericsson are just a few of the big names that have already expressed interest in WARP. Rural India may soon reap the benefits of WARP thanks to Motorola's investigation into a low-cost architecture for wireless Internet. NASA is using WARP to research new ways to reduce spacecraft weight, cost, and complexities via wireless networking. Toyota is using the platform to look into car-to-car communications, which could result in future collision-avoidance and traffic-management technologies. Multiple cellular carriers are also using the platform to test wireless networks that reportedly reached speeds up to 100 times faster than current 3G networks.

One of the more promising applications that WARP has facilitated is the study of cognitive wireless, or the ability of wireless communication networks to sense current performance and environmental conditions and react to enhance bandwidth and efficiency without interfering with other wireless communications.

Unless you're a student or researcher, you probably won't ever see WARP in person, but the research it enables is sure to have a big impact on wireless technologies you use tomorrow and into the future.

### Five Reasons To Watch WARP

- Flexible enough to enable research into a variety of wireless applications
- Encourages innovation from organizations and users who could not previously afford the cost of admission
- Lets researchers share programming and test results across disciplines and applications
- Saves researchers time and money when working with wireless technologies
- Likely to result in better wireless devices coming out faster and costing less