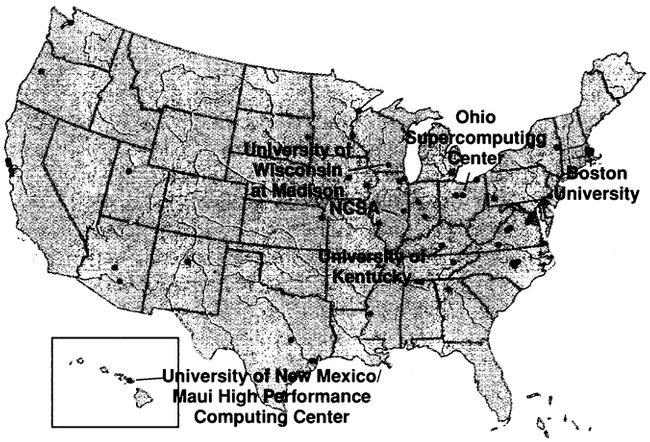
Robert Fenwick, the campus manager for Caterpillar-UIUC relations, that a CAVE can help them quickly test and revise designs for earth-moving equipment while building fewer iron models than in the past. "We don't do it because we think [the CAVE] is a neat toy."

Late last year, Caterpillar took another step when it linked a virtual-reality machine at UIUC with one in Bonn, Germany, allowing engineers to collaborate in testing the operation of a wheel loader—"a great big machine with a big bucket on the front that you load dump trucks with," is Fenwick's definition—in a strip mine. Although the CAVE link was just a demo, using an existing Caterpillar product, "shared tele-immersion" intrigues the global company as a way of including many engineers in the design process while avoiding huge amounts of travel.

The Alliance is also working toward a different kind of inclusion—making all of this new technology as accessible as possible to minorities, women, and people with disabilities. "There is a real danger that [the grid will] end up amplifying inequality," says Roscoe Giles, director of the Center for Computational Science at Boston University and an Alliance executive committee member. In one effort to head off that danger, the Alliance includes members such as the American Indian Higher Education Consortium (AIHEC). The AIHEC is already exploring possible benefits such as collaborating with the Alliance applications group in environmental hydrology to calculate the impact of tearing down a dam on the yield of wild rice, or securing online educational materials for tribal schools. The Alliance has also been "very proactive" in seeking advice on how to make the grid as accessible as possible to vision- and hearing-impaired people, says Gregg Vanderheiden, director of the Trace Research and Development Center at the University of Wisconsin, which has long-standing research efforts in these areas.

In the workaday task of satisfying the demand for computing cycles by the research community, however, both the Alliance and NPACI have fallen behind. "The capacity at the two centers that have been terminated has been shut off to the academic community," says Kentucky's Connolly, who is involved in scheduling computer time for the Alliance. A major setback came when negotiations to fold the Pittsburgh Supercomputing Center into the Alliance broke down, says Borchers of NSF. The Pittsburgh Center is now turning to programs such as the Department of Energy's defense-oriented computing program for funding. "It's caused a little bit of pain," says Connolly.



NCSA

Covering the map. The Alliance includes 60 universities, companies, and laboratories. Its six "supernodes" (red) are supercomputing powerhouses.

Some members of the supercomputing community are harsher: "People don't always view [providing computing time] as glamorous," says one. "The result, in my book, is that those folks haven't focused on [routine] high-end computing." Still, this source expects the problem to "heal itself" as new hardware gets funneled into the Alliance sites.

Meanwhile, Smarr is dreaming within the crayon landscape of the Alliance about finding the next "killer app," the software application that will transform 21st century society. "E-mail was the killer app of the ARPAnet"—the prototype of the Internet. "The Web for the modern Internet. What's gonna be the killer app of the vBNS?"

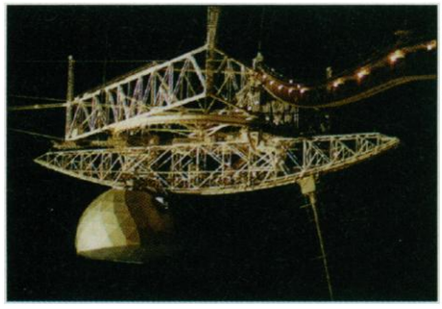
–James Glanz

RADIO ASTRONOMY

Motorola to Limit Signals Over Arecibo

The world's largest radio observatory will not be drowned out by round-the-clock cell phone chitchat. The National Astronomy and Ionosphere Center (NAIC), which operates the Arecibo Radio Telescope in Puerto Rico, announced last week that Motorola Inc. has agreed to limit satellite transmissions above the observatory in a critical part of the radio spectrum for 8 hours a day. The pact, together with a previous umbrella agreement that grants the nation's other 14 radio observatories a shorter observing window, clears the way for Motorola to connect United States customers to a new, worldwide cellular phone service.

The heart of Motorola's new service, called Iridium, will be a $5 billion network of 66 satellites that will transmit phone calls to subscribers by radio signals tuned to about 1621 megahertz. However, just as the signal from a strong radio station may drown out distant stations that broadcast at nearby frequencies, the satellite transmissions will mask some of the faint whispers from space that radio telescopes are built to detect. The agreement focuses on a narrow part of the radio spectrum, from 1610.6 to 1613.8 megahertz. At those frequencies, astronomers can detect charged molecules called hydroxyl radicals that are found, for example, around comets and in the expanding shells of red giant stars.



TONY ACEVEDO

Hold the calls. Arecibo's new reflector should have clear listening 8 hours a day.

The agreement does not stipulate a particular method for Motorola to silence its transmissions, in part because the actual amount of interference has not been measured yet. Instead, the negotiators agreed on a target power level for the satellites' emissions in the hydroxyl band when they are within view of the Arecibo telescope. The interference will be reduced by a factor of roughly 30 during the nighttime hours, but Arecibo astronomers will still have to take significantly longer on their observations to compensate for the increased static. "This is a compromise solution," notes one of the negotiators, former NAIC director Michael Davis, "not a perfect solution from the astronomer's viewpoint."

But the Motorola-Arecibo agreement may become a model for future time-sharing arrangements between astronomers and communications companies. With more private satellite networks on the way and more radio bands to worry about, astronomers will have to keep fighting to protect their access to radio waves. "We'll have to be as creative as we can to protect radio astronomy into the foreseeable future," Davis says.

–Dana Mackenzie

Dana Mackenzie is a writer in Santa Cruz, California.