PSC’s Advanced Networking group is one of the leading resources in the world for network know-how. They carry out research on network performance and analysis in support of high-performance computing applications, provide engineering consulting for advanced networking nationally, and conduct seminars that disseminate knowledge to engineers around the country. In projects such as Web100 and Net100, they develop technologies that will define the networks of the future.

**MORE INFORMATION:** [http://www.psc.edu/networking](http://www.psc.edu/networking)

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**GETTING IN TUNE WITH WEB100 & NET100**

With funding from the National Science Foundation and Cisco Systems, PSC network researchers—in collaboration with the National Center for Atmospheric Research (NCAR) and the National Center for Supercomputing Applications—have developed software to “tune” the Internet protocol in computer operating systems to better exploit available network bandwidth. Called Web100, this software is now used in many research projects nationwide.

Portions of Web100 are now included in the Linux operating systems and a development release of Windows. With both operating systems, the Web100 effort is working to enable ordinary scientific users with high-performance network connections to automatically attain high-speed data transfers (100 megabits per second or higher) without help from network experts or manual tuning.

In a related project called Net100, funded by the U.S. Department of Energy, PSC’s network research group collaborated with Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory and NCAR to create software tools that allow operating systems to tune themselves in response to changing conditions on the network. PSC incorporated selected Net100 enhancements into Web100.
THREE RIVERS EXCHANGE

Through the Three Rivers Exchange (formerly the Pittsburgh GigaPoP), a high-speed network crossroads that serves Carnegie Mellon, Penn State, the University of Pittsburgh, West Virginia University and the Pittsburgh Public Schools, PSC provides advanced network resources for education and research. The Exchange connects the universities and PPS to Abilene, a high-performance network linking more than 250 U.S. universities and research organizations.

3RX MEMBERS:

ACADEMIC
Carnegie Mellon University, University of Pittsburgh, Pennsylvania State University, West Virginia University, Pittsburgh Public Schools

GOVERNMENT LABORATORY
The National Energy Technology Laboratory, NASA Independent Verification and Validation Facility

BUSINESS
Comcast, Westinghouse Electric Co.

OTHER
Computer Emergency Response Team

NETWORK CONNECTIONS:

NATIONAL LAMBDARAIL AND RESEARCH NETWORKS
Abilene—2.4 Gbps, Teragrid Extensible Backplane Network—30 Gbps.

NATIONAL COMMERCY INTERNET NETWORKS
AT&T Worldnet—250 Mbps, Verio—300 Mbps

LOCAL NETWORK
PITX (Pittsburgh local exchange network), Comcast

NOTE: GBPS & MBPS: A BILLION (GIGA) AND A MILLION (MEGA) BITS PER SECOND.

ON THE NETWORK: EXCHANGE NEWS

In partnership with the University of Pittsburgh, PSC this year became a full member of National LambdaRail, the next-generation network infrastructure. Rather than a single network, the NLR infrastructure is multiple networks that exist side-by-side in the same fiber-optic cable, but are independent, each supported by its own lightwave, or lambda.

“NLR pushes beyond existing limitations of conventional Internet backbones,” says PSC director of networking Wendy Huntoon. “This will allow us, for instance, to create a dedicated connection for a specific purpose, such as to support rapid data transfers between PSC and Oklahoma for a tornado forecasting experiment.”

At least half the NLR resource will support networking research. PSC network engineers will use it to expand their work on Path MTU Discovery, a method to assess the best Maximum Transfer Unit—the biggest data packet a given connection can efficiently use.

In August 2004, the Exchange installed a high-speed link to high-speed Internet provider Comcast. This peering arrangement allows Comcast and the Exchange to exchange traffic directly rather than going through national Internet backbones, enhancing access to regional resources for Comcast high-speed Internet subscribers.

“This not only improves communication between regional individuals and institutions,” says Huntoon, “it also lowers costs. By keeping local network traffic local, Comcast and Exchange customers reduce latency in local connections and save money from reduced Internet bandwidth use.”

The Exchange also peers with PITX—a peering exchange that includes local Internet Service Providers such as Pair Networks, Telerama and Nauticom. Comcast users, therefore, should also see improved performance when connecting to these service providers.
A workshop underway in the PSC Computer Training Center, equipped with 30 "dual-boot" workstations and a projector for overhead display of the instructor’s desktop.

PITTSBURGH SUPERCOMPUTING CENTER WORKSHOPS (2003-2004)

Introduction to Terascale Code Development

Terascale Code Development

New Methods for Developing Petascaleable Codes

Developing Bioinformatics Programs

Statistical Analysis of Neuronal Data

Computational Cell Biology: Modelling and Simulation

Parallel Programming Techniques

Nucleic Acid and Protein Sequence Analysis

The PSC operational management team: (front, l to r) David Kapcin, manager, financial affairs; Nick Nystrom, manager, strategic applications; Bob Stock, associate director; Rich Raymond, manager, user support; Sergiu Sanielevici, assistant director, scientific applications and user support; J. Ray Scott, assistant director, systems and operations; (back, l to r) John Kochmar, facilities manager, systems and operations; David Deerfield, assistant director, biomedical initiative; Jim Marsteller, manager, Three Rivers Exchange. Not in photo: Gwendolyn Huntoon, Janet Brown, Joel Stiles, Elvira Prologo.