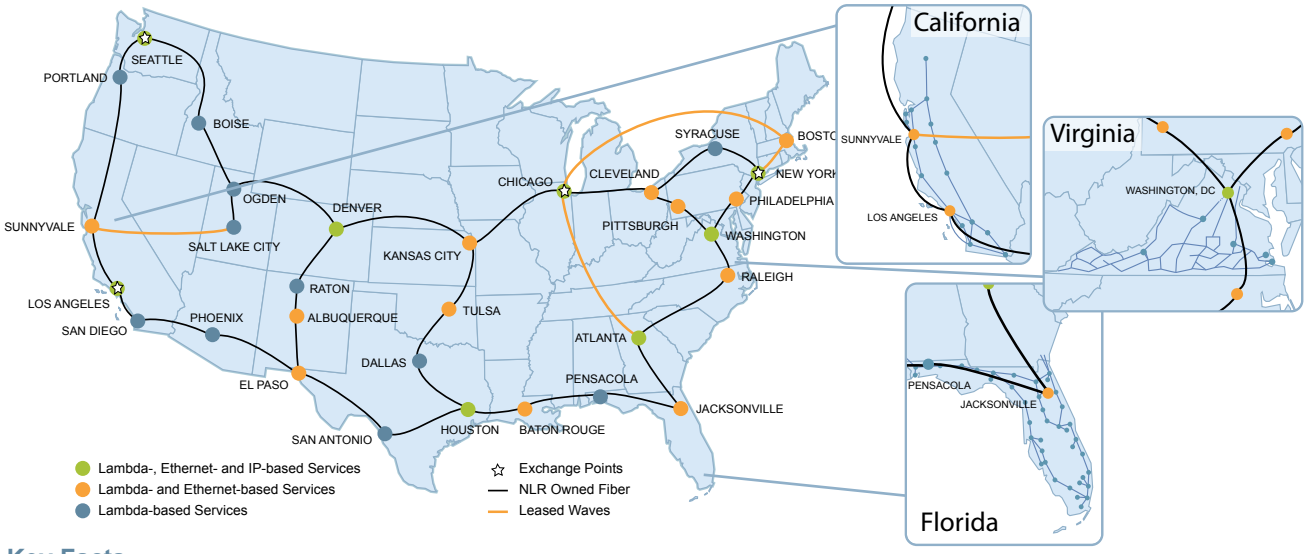
National LambdaRail

National LambdaRail (NLR) is a high-speed, fiber-optic network infrastructure covering 12,000 miles and 21 states across the U.S. Owned by the U.S. research and education community, NLR does not impose any restrictions on usage, as do commercial carriers, offering users total flexibility and control. With a total capacity of 1600 Gbps, production 40G implemented and planning underway for 100G, NLR is the cutting-edge network platform for a wide range of advanced research projects and public-private partnerships.

NLR Offers

An Advanced, Multi-Service Network . . . and Built-in Connectivity to Regions Coast-to-Coast

13 Regional Networks are NLR Members



Key Facts

- Capacity: Up to 1600 Gbps
- Ownership: U.S. research and education community
- Participating universities, federal labs: 280+
- Ultra high availability: 99.999% on Layer 1 routes, 100% on Layer 2 nodes
- Coverage: 12,000 miles, 30+ major cities
- Founded: 2003
- Headquarters: Cypress, CA

Global Connections, Global Collaboration

- 5 international exchange points: Chicago; Jacksonville, FL; Los Angeles; Seattle; and New York
- Direct connections to 15 other research and education networks
- Links to other networks via partnership with Global Lambda Integrated Facility (GLIF)

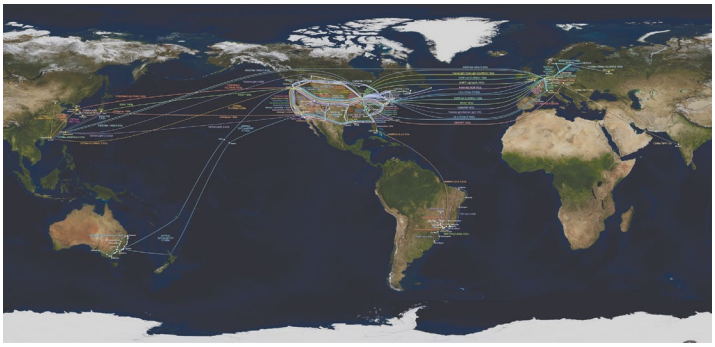


Photo source: Global Lambda Integrated Facility

Innovation Leadership

- First high-performance, national infrastructure owned by the research and education community
- First transcontinental, production 10-Gigabit Ethernet network
- First intelligently managed, nationwide peering and transit program focused on research applications
- First and only non-commercial Cisco TelePresence exchange
- First international TelePresence session over a research and education network

Examples of NLR Users and Applications

NexCAVE is a 3D, automatic virtual environment developed by the **California Institute of Telecommunications and Information Technology (Calit2) at the University of California, San Diego** from modified HDTV LCD screens. When paired with polarized stereoscopic glasses, the NexCAVE's modular, micropolarized panels and related software make it possible for a broad range of scientists—from geologists and oceanographers to archaeologists and astronomers—to visualize massive datasets in three dimensions, at unprecedented speeds and at a level of detail impossible to obtain on a desktop display.

Photo source: Calit2

Scientists from **Georgia Tech** become part of the K-12 curriculum in Barrow County, northeast of Atlanta—over a live video feed under the **Direct to Discovery** program, which NLR helped to make possible.

Photo source: Georgia Tech

GENI, the Gobal Environment for Network Innovations sponsored by the National Science Foundation, takes advantage of all three NLR national service offerings to explore networks of the future.

Iowa Health System's hospitals and clinics in over 70 communities in Iowa, Illinois and Nebraska are connected to the company's hub in central Iowa, where traffic is carried by a 10-Gigabit Ethernet connection to NLR's peering facility in Chicago. A broad range of tele-health and tele-medicine applications are now being rolled out.

NASA uses NLR for high-speed links between its facilities in California, Houston, Maryland and others.

Leading, multi-million dollar scientific instruments from **Oak Ridge National Laboratory**, such as aberration corrector microscopes (photo, right), can be used and manipulated in real time by researchers at London's Imperial College—over a high-speed, low-latency link from NLR.

Photo source: ORNL

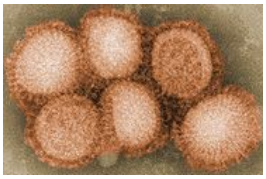
The **Open Cloud Consortium (OCC)** has developed the first benchmark for comparing the performance of clouds of different architectures. The OCC's Open Cloud Testbed, which uses NLR as its platform, is the world's only wide area cloud that is built on 10-Gigabits per second networks.

The only research and education network with its own **Cisco TelePresence** exchange, NLR enables students, educators and researchers to virtually extend their classroom or lab environments to include counterparts across the country or around the world.

Photo source: Cisco

TeraGrid, the world's largest, distributed cyberinfrastructure for scientific research funded by a major grant from the National Science Foundation, uses NLR as a backbone network.

Using the Ranger supercomputer and high-speed links from NLR and NLR member LEARN, researchers at the **Texas Advanced Computing Center at the University of Texas at Austin** retrieved and analyzed comprehensive U.S. and global data to map the spread of the H1N1 virus and study mutations that could lead to drug resistance.



H1N1 virus. Photo source: CDC

The **U.S. Large Hadron Collider network**, funded by the Department of Energy, leverages the NLR platform to connect U.S. institutions to the Collider in Geneva, Switzerland.