

Lawrence Berkeley National Laboratory Uses the JDSU Network Analysis and Monitoring Tools to Troubleshoot it's Massive LAN

Challenge

- Maintaining the diverse systems that run some of the worlds most advanced research projects.

Product

- The JDSU Surveyor/THG LAN monitoring and analysis suite

Benefits

- THG/Surveyor provides Berkeley Lab Network Managers with a snapshot view of the health of the LAN at 5 second intervals.
- The JDSU tools allow Berkeley Laboratory is able to run their large, critical network at peak performance, with limited resources

Lawrence Berkeley National Laboratory (Berkeley Lab) has been a leader in science and engineering research for more than 70 years. Berkeley Lab is a U.S. Department of Energy (DOE) national laboratory managed by the University of California and employs a staff of about 4,300, including guest researchers and students.

Berkeley Lab conducts unclassified research across a wide range of scientific disciplines with key efforts in fundamental studies of the universe; quantitative biology; nanoscience; new energy systems and environmental solutions; and the use of integrated scientific computing as a tool for discovery.

The computing infrastructure to support this advanced research is large and diverse, ranging from desktop systems of all types (PCs and Macs), Windows NT, Solaris and Linux-based server farms, to more specialized computers that are used for data acquisition and analysis in such scientific research efforts as the Advanced Light Source, the Joint Genome Institute, the National Energy Research Scientific Computing Center and the 88-inch Particle Accelerator. In total, more than 6,000 computers and nearly 13,000 network-attached devices are networked via LBLnet, which provides the enterprise LAN connectivity and infrastructure for Berkeley Lab.

Users range from scientists to administrators accessing everything from Microsoft SQL Server and Oracle databases to highly specialized data generated by industrial computing equipment.

The task of managing this massive network falls upon the LBLnet Services Group, an 11-member team that provides local area network (LAN) infrastructure and network connection support services to Berkeley Lab staff and research programs. In addition, LBLnet Services Group supports remote access services to provide network connectivity to LBLnet users not physically located on the site. The majority of LBLnet's connections are currently Fast Ethernet, with the distribution links running at Gigabit Ethernet or in the process of being upgraded to Gigabit Ethernet. Berkeley Lab has plans to migrate their core network to 10 Gigabit Ethernet before year-end. Several routers are connected via a star topology.

Networking the Grid

According to Mike Bennett, senior network engineer with LBLnet Services Group, the group's mission has become very similar to that of the local power company. "Our network is becoming a utility, and people expect to be able to immediately plug into the network and be fully operational," he said. "With the wide variety of disparate systems, applications and operating systems we support, that is not an easy task."

The LBLnet Services Group keeps a watchful eye on traffic growth to develop and implement plans to prevent network congestion. While the staff monitors and measures network traffic to try to ensure that future networking needs are being addressed, researchers who foresee projects requiring higher bandwidth connectivity are encouraged to let the team know well in advance. At other times, the LBLnet Services Group performs real-time troubleshooting and analysis of the network in an attempt to anticipate problem areas "before they become problems."

“The amount of data sent over LBLnet roughly doubles each year,” Bennett said. “It is crucial that we have an effective means of troubleshooting, analyzing, as well as predicting network performance. To proactively manage our LAN, it is crucial for us to monitor its overall health on an ongoing basis in order to avoid problems,” Bennett said.

In a network as large as LBLnet, an interruption in network traffic flow could be due to any number of possible conditions. To help manage its LAN, Berkeley Lab employs the JDSU network management tools to monitor their campus LAN traffic and perform real-time captures for analysis, when necessary.

“If you are doing real-time analysis or troubleshooting of a network, you can’t afford to drop packets,” Bennett said. “We need full data capture in real-time, or run the risk of not getting the information you need to solve the problem. The JDSU THG/Surveyor network analysis solution provides us with complete network packets and enables us to get at the root of problems.”

As Easy as Checking the Weather

To provide a visual snapshot of the health of the LAN, LBLnet Services Group displays the output from the JDSU Surveyor/THG which is monitoring LBLnet’s top 10 data flows in real-time on a 42 inch monitor. At five-second intervals, the data is refreshed, enabling the team to monitor network utilization, errors, and which lines are the most utilized. “At a glance, it’s almost as simple as checking the weather,” Bennett said.

“Even with the scope and magnitude of our network operations, we don’t really have a Network Operations Center,” Bennett conceded. “What we have is a set of cubicles and a few offices with this big screen hovering overhead. When you consider the scope of what we accomplish, and the number of people we do it with, and the number of people we support, we operate fairly lean,” understated Bennett. “Tools like the JDSU network analyzers go a long way towards helping us stretch out our resources and keep our network up and running to meet the scientific and administrative needs of the Lab.”

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