Real-Time HDTV Broadcast From USA To Japan Enabled By Advanced Networks

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Dignitaries and researchers attending the Japan Gigabit Network 2 (JGN2) Symposium in Osaka, Japan today listened and watched as Internet visionary Larry Smarr gave the keynote presentation on a large screen above the podium. Unlike traditional keynote talks, however, Smarr was 5,000 miles away in Seattle, Washington.

Advances in transmitting live, uncompressed high-definition television (HDTV) signals over optical networks are enabling true tele-presence, in which participants feel they are together in the same room. The iHD1500 broadcast system used for this event was developed by the University of Washington's Research Channel. A server in Seattle transmitted high-definition digital video and digital audio at very high quality and very low latency to a client system in Osaka. Data went over the University of Washington campus network to the Pacific Northwest GigaPoP (PNWGP), then via a 10 Gigabits per second (Gbps) transpacific link from Seattle to Tokyo, and then via the JGN2 to Osaka. The transpacific link was provided by the Internet Educational Equal Access Foundation (IEEAF), which is managed by the PNGWG in Seattle and the WIDE project in Japan.

Smarr, director of the California Institute for Telecommunications and Information Technology [Cal-$(IT)^2$] and principal investigator of the National Science Foundation-funded OptIPuter project, talked about the emergence of a new cyberinfrastructure based on network parallelism, in which distributed clusters and instruments are tightly coupled using multiple wavelengths of light, or 'lambdas,' on single optical fibers. The

ability to stream several gigabits of data in parallel, like in this HDTV transmission, is enabling new modes of communication. “The clear crisp images and sounds that HDTV affords make for better dialogue and interaction with colleagues over distances,” said Smarr, who is also a professor at the University of California, San Diego (UCSD) Jacobs School of Engineering. “The goal is to make these sorts of communication technologies persistent, so that far-away colleagues appear to be just beyond the ‘Looking Glass’.”

In his talk, Smarr noted that Cal-$(IT)^2$ is incorporating advanced video-over-fiber networking technologies into its two new buildings at UCSD and UC Irvine. Facilities are slated to include a digital cinema and HDTV production facility, as well as dedicated meeting and public spaces with large-format displays to support tele-presence and collaboration. Said Smarr: “Every type of research will benefit if we can tear down walls and let scientists and engineers talk and work together in real time as if they were in the same room -- even if they’re thousands of miles away.”

Tomonori Aoyama, a professor of Information and Communication Engineering at the University of Tokyo, chair of the JGN2 management committee, and chair of the Symposium’s keynote session, expressed his sincere gratitude to all who contributed to its success. “The goal of the Symposium was to present the research and development activities taking place using Japan’s JGN2, operated by the National Institute of Information and Communications Technology (NiCT),” said Aoyama. “I am very pleased that we used JGN2 and IEEAF broadband network technologies during the featured remote presentation by Dr. Smarr to explain the needs and applications for these technologies.”

JGN2, an advanced network testbed for research and development, is both a national and international testbed. It supports high-speed networking technologies and application advancements. Nationally,

JGN2 is a 20 Gbps backbone network that connects dozens of universities in all Japanese prefectures. Internationally, JGN2 connects Tokyo via a 10 Gbps link to the StarLight facility in Chicago, where it peers with the USA's National LambdaRail, Abilene and other advanced international, national, and regional research and education networks.

"We are not using traditional 'best-effort' networks, which is a milestone for all of us," explained Ron Johnson, Vice President of Computing & Communications at University of Washington. "We are working with colleagues at JGN2, WIDE, IEEAF, PNWGP, StarLight and other locations worldwide to create 'deterministic' networks using multiple lambdas over optical fibers, to guarantee the bandwidth speeds and latency in order to do real-time HDTV transmission. We will continue to pursue this, to make high-quality HDTV transmission both persistent and ubiquitous."

Source: UCSD