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A. Summary of Technical Activities

A.1. Euro-Link Network Status and Institutions

A.1.a. CERN

Networked researchers at CERN remotely collaborated in two research application demonstrations during the iGrid 2000 event (Distributed Particle Physics Research; Global Internet Digital Video Network).

CERN is now peering with the STAR TAP EMERGE (DiffServ) Router, which enabled CERN and iCAIR to conduct STAR TAP Router-enabled DiffServ QoS tests during iGrid 2000.

A.1.b. IUCC

IUCC upgraded the software for its SkyX satellite boxes in July, causing problems with asymmetric routes. Hans-Werner Braun at SDSC could not reach schools in the USA from Tel Aviv University, although he could reach computers located at STAR TAP; SDSC routing is asymmetric, choosing vBNS outbound to Illinois but Abilene on the return. Braun, working with Linda Winkler, helped IUCC correct the SkyX software.

Joe van Zwaren, of Israel's Ministry of Science, Culture and Sport, contacted Tom DeFanti in early June about showcasing VR technology at Israel's largest annual telecommunications conference to be held in November 2000. Mr. van Zwaren has identified three Israeli universities currently negotiating with their administration to purchase VR devices. EVL will likely send an ImmersaDesk and three staff members to demonstrate tele-immersive applications at this conference.

STAR TAP is multicast peering with IUCC.

A.1.c. NORDUnet

Networked researchers at Sweden's Royal Institute of Technology remotely collaborated in two research application demonstrations during the iGrid 2000 event (Steering/Vis Finite-Difference Code; Global Internet Digital Video Network).

On June 22, Peter Villemoes announced NORDUnet has put its advanced research traffic on a dedicated STM-1 155Mbps link between Stockholm and New York, which can be viewed at http://www.nordu.net/connectivity/. NORDUnet's US capacity now totals 777Mbps, as the second GTS 155Mbps connection was put into operation April 8, 2000. See http://www.nordu.net/news/index.html#777

A.1.d. RENATER2

No information to report.

A.1.e. SURFnet

Networked researchers from the Academic Computing Services Amsterdam (SARA) and SURFnet remotely collaborated in two research application demonstrations during the iGrid 2000 event (Architectural Linked Immersive Environment; Global Internet Digital Video Network).

SURFnet began working with Teleglobe in early April to upgrade its connection to STAR TAP. In August, SURFnet began testing a 155 Mbps connection between New York and STAR TAP. (To be reported next month.)

A.1.f. DANTE

DANTE/DFN researchers from Germany's Fraunhofer Institut Graphische Datenverarbeitung (Darmstadt), Albert-Einstein-Institute (Potsdam), Konrad-Zuse-Zentrum fur Informationstechnik (Berlin), and High Performance Computing Center Stuttgart, remotely collaborated in three research application demonstrations during the iGrid 2000 event. [Note: DFN has its own line into New York from Europe, but it is managed by DANTE.]

In collaboration with DANTE for the iGrid 2000 event, Abilene carried transit traffic from New York to STAR TAP for JANET (the U.K. participated in an iGrid 2000 demo, Distributed Simulation Analysis), RedIRIS (Spain participated in Global Internet Digital Video Network), and DFN until the end of July, when connectivity was terminated by DANTE until a "non-technical" solution is agreed to and implemented.

A.1.g. BELNET

On July 15, Jan Torreele of Belgian National Research Network (BELNET) requested eligibility to connect to STAR TAP, and was advised by Tom DeFanti to submit a proposal to Steve Goldstein. BELNET plans to dedicate a full 45 Mbps to research traffic. BELNET initially wants to connect through a DS-3 from New York. This connection is pending a new transatlantic circuit and local connection to Chicago (expected October 2000), as well as NSF approval (proposal forthcoming).

A.2. Engineering Services

A.2.a. STAR TAP International Transit Network (ITN)

STAR TAP ITN is a new service currently being developed by STAR TAP, CANARIE and Internet2 to facilitate connectivity among international National Research Networks (NRNs) that now connect to one of the coasts of North America. A meeting among the three groups was held in August 2000 to discuss relevant issues. [To be reported in next month's report.]

A.2.b. STAR TAP Router Peering

New STAR TAP Router peers include Russia's MIRnet [http://www.friends-partners.org/friends/mirnet/home.html], which began passing traffic June 13, and Chile's REUNA, which began passing traffic July 27 [http://www.reuna.cl]. China's CERNET is now in the process of connecting to STAR TAP. Current Peering Matrix information is at [http://www.startap.net/ENGINEERING/].

A.2.c. 6TAP

In late June, Linda Winkler installed a 6TAP 6to4 Cisco router to the STAR TAP rack, which allows networks without native IPv6 support to STAR TAP to participate in the 6TAP project. [6to4 uses special IPv6 addresses to automate IPv4-to-IPv6 tunneling.]

The iGrid 2000 "Advanced Networking for Telemicroscopy" demonstration between UCSD and Osaka University, successfully showcased end-to-end IPv6 connectivity. UCSD peered over IPv6 with vBNS and ESnet, and had a route to Osaka University over IPv6.

A.2.d. STAR TAP NLANR Web Cache

No update to report.

A.2.e. DiffServ

In July, iCAIR and CERN conducted QoS demonstrations during the iGrid 2000 event via the STAR TAP DiffServ Router. Peering will continue.

iCAIR students working under Joe Mambretti conducted a transatlantic DiffServ demonstration at the TERENA Conference, in Lisbon, Portugal, May 22-24. The demonstration presented the potential of the GiDVN to provide QoS-enabled DV, based on Internet Engineering Task Force (IETF) DiffServ architecture, over international advanced high performance networks. The demonstration also involved middleware, including components related to the recent IETF RFC on Middleware: RFC 2768. [http://www.terena.nl/tnc2000/demos.html]

See [http://www.evl.uic.edu/cavern/EMERGE/].

A.3. NOC Services

The NOC generated the following video services for the iGrid 2000 event, described at http://www.indiana.edu/~video/igrid2000/home.html#litton

- Interactive and multicast broadcast-quality videoconferencing—Litton Network Access Systems CAMVision-2 MPEG/IP codecs were used to provide broadcast quality interactive and streaming video from the iGrid floor. Highlights include multicast to Litton equipped Internet2 sites; and first live IP-based, trans-Pacific distribution to commercial cable reaching television audiences in the Seattle area, and rebroadcast on the Research Channel to reach direct broadcast satellite viewers across the US.
- Point-to-point H.323 videoconferencing—In cooperation with Wire One, 30fps at 384/512/768Kbps utilizing Polycom Viewstation 512 systems.
- Streaming video—Disseminated collaborative demonstrations to Internet2 and Internet1 communities utilizing streaming video. IBM Content Manager VideoCharger was used for high-quality 1.5Mbps multicast MPEG1 and Real for commodity-quality webcast.

Doug Pearson reported all of the services "worked well," and a video is expected to be available at the above URL by the end of August. Researchers running the Distributed Simulation Analysis, Telemicroscopy, CyberCAD, and Blue Window Pane II applications utilized the H.323 videoconferencing systems to communicate with their home-based collaborators during setup and throughout the course of the demonstrations. EVL/UIC, responsible for several iGrid demos, also used a Polycom system to communicate with their home-based collaborators.

On the last day of demonstrations, the Litton CAMVision systems were used to send a broadcast-quality, edited half hour program from the iGrid 2000 venue to University of Washington, where it was bridged to community-access educational cable television in the Seattle area.

The NOC would like to generate a STAR TAP animated traffic map in late summer. It has sought permission from every STAR TAP peer (including Euro-Link NRNs) to gather network statistics from their host routers. Response has been light, but we continue to pursue this effort.

The URL for the Euro-Link/STAR TAP Router Proxy is http://noc.euro-link.org/ (click Network Monitoring, click STAR TAP Router Proxy). The Router Proxy allows users to submit 'show' commands to STAR TAP router. The user selects the router and a command, and the output is displayed in a separate frame. This allows Euro-Link peers to check routing configurations on the STAR TAP router, and help them troubleshoot problems as well.

The URL for the STAR TAP Syslog Monitor is http://noc.euro-link.org/ (click Network Monitoring, click System Monitor). This monitor automatically watches system logs of network components, and reports significant events via email to NOC operations and engineering. Individuals can view and search the current and past syslogs from the STAR TAP router.

A.4. Euro-Link Performance Analysis Tools

A.4.a. Network QoS of Real-Time Multimedia

QoSIMoTo (QoS Internet Monitoring Tool) [www.evl.uic.edu/cavern/qosimoto] is available on the web for IRIX and Linux.

A.4.b. Network Monitoring

In May, CAVERNsoft G2 version 1.1 was released. CAVERNsoft G2 integrates network performance monitoring into all the networking classes. For general info on CAVERNsoft G2, see [http://www.evl.uic.edu/cavern/cavernG2/]. For more info on the new changes in 1.1 see [http://www.evl.uic.edu/cavern/cavernG2/README.IRIX.html#VERSIONINFO].

A.4.c. Low Latency State Transmission Over Long Distance Networks

No updates to report at this time.

B. Accomplishments

B.1. iGrid 2000

The iGrid 2000 event during INET 2000 in Yokohama, Japan, July 18-21 was an overwhelming success. It featured 24 collaborative research applications from 14 regions around the world. IGrid connected to the JGN, the WIDE Project Network (in cooperation with NTT, TTNet and PNJC), APAN and the APAN/TransPAC (100 Mbps) link to STAR TAP. A debriefing session following the third day of demonstrations yielded no negative comments or reports of technical failure.

A special web page for iGrid 2000 that provides application descriptions, schedules and SNMP information is at http://www.startap.net/igrid2000/

B.2. Euro-Link Applications

Active US/European collaborations utilizing high-performance research networks have been documented for CERN, Renater2, SURFnet and NORDUnet. All four have been uploaded to the live site. [http://www.euro-link.org/APPLICATIONS/]. Documentation of IUCC applications is ongoing.

B.3. Meetings Attended

July 17-21, 2000. Tom DeFanti had several discussions with Franck Boissiere who is in charge of Research Networking for the European Commission on ongoing difficulties in connecting DANTE to STAR TAP. Tom also met with Ralf Schaefer, Head of the Image Processing Department at the Heinrich-Hertz-Institut (HHI) in Berlin, who is interested in collaborating with EVL.

July 17, 2000. Annual meeting of the STAR TAP International Advisory Committee met in Yokohama, Japan. Minutes to be posted at http://www.startap.net/ABOUT/MEETINGS.html

July 16, 2000. Tom DeFanti, Maxine Brown and Laura Wolf met with SURFnet's Kees Neggers to discuss SURFnet's DWDM network, now under construction, and future plans to connect it to STAR TAP and Canada.

B.4. Publications

iGrid 2000 brochure (edited by Maxine Brown), INET 2000, Electronic Visualization Laboratory, University of Illinois at Chicago.[www.startap.net/igrid2000]

Y. Zhou, T. Murata, T. DeFanti, "Modeling and Performance Analysis Using Extended Fuzz-Timing Petri Nets for Networked Virtual Environments," IEEE Transactions on Systems, Man and Cybernetics (SMC), to appear.

Y. Zhou, T. Murata, T. DeFanti, and H. Zhang, "Fuzzy-Timing Petri Net Modeling and Simulation of a Networked Virtual Environment – NICE," Institute of Electronics, Information and Communication Engineers (IEICE) Transactions in Japan (Special Section on Concurrent Systems Technology), to appear.

B.5. Panel Presentation

Tom DeFanti and Tomonori Aoyama, University of Tokyo, chaired a panel at INET 2000 entitled "iGrid 2000: Demonstrating New Means for Global Collaboration." Speakers and topics:

- Franck Boissiere, European Commission: European Global Networking R&D Cooperation
- Harvey Newman, California Institute of Technology: The Grid Physics Network
- Ryusuke Ogasawara, Information Technology Center, University of Tokyo: SUBARU telescope in Hawaii [teleconferenced into the Yokohama Convention Center]
- Michel Reilhac, executive director, Forum des Images: Digital Cinema

B.6. Software Releases

CAVERNsoft G2, version 1.1 [http://www.evl.uic.edu/cavern/cavernG2/] has been released.

QoSIMoTo (QoS Internet Monitoring Tool) [www.evl.uic.edu/cavern/qosimoto] is available on the web.

C. Collaboration Activities

- Ongoing with SARA in Amsterdam. Collaborative work on the IIT design was demonstrated at iGrid 2000; EVL (Chicago) and SARA (Amsterdam) collaboratively interacted with iGrid attendees in Yokohama.
- Working with SARA in The Netherlands to experiment with an EVL-designed packet-level Forward Error Correction scheme.

D. Summary of Award Expenditures (July)

Spending is within budget.