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A. Summary of Technical Activities

A.1. Euro-Link Network Status and Institutions

A.1.a. CERN

iCAIR/CERN DiffServ testbed experiments commenced before the STAR TAP DiffServ Router was in place. iCAIR/CERN currently does direct peering , although iCAIR director Joe Mambretti is interested in integrating the STAR TAP DiffServ router into some of its experiments. He is also interested in doing some QoS demonstrations with CERN at the iGrid 2000 event at the July INET conference in Yokohama. To do this, Mambretti is talking to Linda Winkler about having iCAIR peer with the STAR TAP DiffServ Router.

A.1.b. IUCC

On May 5, IUCC's international T3 link was taken down to troubleshoot and correct a high rate of packet loss, following a daylong peering outage with Abilene. The errors were corrected and connectivity was restored the same day. Further connection tests took place May 25 with minimal interruptions.

STAR TAP is now multicast peering with IUCC.

A.1.c. NORDUnet
No updates to report.

A.1.d. RENATER2
May 5-9, RENATER's peering with Abilene and STAR TAP was intermittently unavailable. Technicians continue to investigate.

In April, France Telecom (FT) ordered an upgrade of its current DS-3 connection (to OC-3) to Ameritech's NAP in Chicago; however, delivery was delayed since FT ordered its upgrade from an Ameritech-authorized distributor instead of Ameritech directly, and the provisioning of the circuit was incorrectly ordered. The status of the connection upgrade is still pending.

A.1.e. SURFnet
SURFnet began working with Teleglobe in early April to upgrade its connection to STAR TAP. The date of occurrence is pending.

A.1.f. DANTE
On April 11, as the first instance of the "STAR TAP International Transit Network (ITN)," CA*net3 carried DANTE's Ten-155 pan-European research network traffic from New York to STAR TAP in Chicago. On April 13, this link was temporarily shut down until DANTE provisions more bandwidth for its connection to CA*net (currently 10 Mbps). This is now under consideration by DANTE management, Howard Davies and Dai Davies. Tom DeFanti, Linda Winkler and Bill St. Arnaud are following up. Technical upgrades to increase bandwidth are expected by the end of June.

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. Given the problems with providing DANTE with transit, this will be a major topic of the STAR TAP International Advisory Committee, scheduled to meet at INET 2000 in July.

A.2.b. STAR TAP Router Peering
Two new MREN schools, University of Chicago and University of Wisconsin-Milwaukee, are now peering with the STAR TAP router. The latest Peering Matrix information is posted at [http://www.startap.net/ENGINEERING/]

On May 12, the STAR TAP rack underwent extensive changes to upgrade remote servicing access to the rack, which affected the STAR TAP Router, Switch and the 6TAP Router. The equipment in the rack required a power cycle that caused a brief outage of all STAR TAP services.

A multicast beacon to test and debug multicast traffic was installed at STAR TAP.

A.2.c. 6TAP
One of the iGrid 2000 demonstrations, "Advanced Networking for Telemicroscopy," between UCSD and Osaka Univerity, will showcase their end-to-end IPv6 connectivity. UCSD is peering over IPv6 with vBNS and ESnet, and has a route to Osaka University over IPv6.

A.2.d. STAR TAP NLANR Web Cache
No update to report.

A.2.e. DiffServ
See [http://www.evl.uic.edu/cavern/EMERGE/]. The STAR TAP DiffServ router is now installed and can accept connections from STAR TAP participants.

A.3. NOC Services

In preparation of the STAR TAP animated traffic map the NOC plans to produce this the summer, the NOC has sought permission from every STAR TAP peer (including Euro-Link NRNs) to gather network statistics from their host routers. The goal is to post it online by iGrid in July.

In May, the NOC unveiled the following new web tools:

- **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. [See http://noc.euro-link.org (click on Network Monitoring, click on 'STAR TAP Router Proxy' under Monitoring Tools).]
- **Log watcher –** Automatically watches system logs of network components. Reports of significant events are emailed to NOC operations and engineering. Also, a STAR TAP Syslog Monitor has been developed where individuals can view and search the current and past syslogs from the STAR TAP router. [See http://noc.euro-link.org (click on Network Monitoring, click on 'System Monitor' under Monitoring Tools).]

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. DANTE

No updates to report at this time.

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

June 1-2, 2000. EVL Senior Research Scientist Jason Leigh and student Chris Scharver attended the Eurographics Workshop in Amsterdam and demoed a semi-public VR walkthrough of Amsterdam architect Rem Koolhaas' new Illinois Institute of Technology (IIT) building, as well as "TIDE: The Tele-Immersive Data Explorer." TIDE [www.evl.uic.edu/cavern], developed by EVL in collaboration with UIC National Center for Data Mining (Bob Grossman, director) and DOE ASCI researchers, is a CAVERNsoft-based collaborative, immersive environment for querying and visualizing data from massive and distributed datastores. The fully immersive demo, shown in SARA's CAVE, was a huge success. Leigh reported both demos went off without a single problem, and noted, "We got a lot of positive reaction from the audience, especially of TIDE. Many were as impressed by our work as with the quality of the networking supporting the collaboration." He referred those interested in the networking aspect to Tom DeFanti and Maxine Brown, and to the STAR TAP web site. Leigh met with Laurent Grizon of Institut Francais du Petrole to discuss a possible future collaboration.

While at the conference, they met with a student of Ralf Schaefer, the Head of the Image Processing Department at Heinrich-Hertz-Institut in Berlin, Germany, to discuss their participation in N*VECTOR, EVL's collaborative effort with researchers at University of Tokyo and NTT.

Also, while at SARA in Amsterdam, Jason and Chris met with Ed Breedveld, a SARA researcher with whom they have been collaborating on "Saranav"–a Performer-based CAVE application to load and view 3D polygonal datasets in the CAVE–as well as QoS experiments. (See Euro-Link Annual Report, April 1, 2000, Section H.3).

May 31-June 2, 2000. Maxine Brown, Tom DeFanti and Linda Winkler met with Hiroshi Esaki of University of Tokyo and researcher Gorochan Kunito to discuss iGrid 2000 and international networking. There is great concern about transiting Germany's applications to Yokohama, since DANTE (which brings German DFN traffic to the USA) wants to only let limited IP addresses through to STAR TAP, due to bandwidth constraints on their Atlantic links.

May 20, 2000. Tom DeFanti met with George Strawn at O'Hare airport to give an update on STAR TAP and Euro-Link matters in preparation for a trip to Portugal by President Clinton and NSF CISE Associate Director Ruzena Bajcsy.

May 16, 2000. Linda Winkler presented "STAR TAP ITN International Transit Network" to Internet2/NLANR Joint Techs meeting in Minneapolis, MN. Met with Jim Williams, Steve Peck and Kazunori Konishi (APAN) to discuss Euro-Link/STAR TAP/TransPAC network issues. Discussion focused on the coming iGrid 2000 demonstrations at INET 2000.

May 11, 2000. Maxine Brown, staff Laura Wolf and student Brenda Lopez held a meeting with Linda Winkler on the Access Grid to discuss visualizing international traffic for iGrid 2000 in July. The plan is to post network performance maps on the STAR TAP web site.

B.4. Publications

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.

Tomoko Imai, Zhongwei Qiu, Sowmitri Behara, Susumu Tachi, Tomonori Aoyama, Andrew Johnson, Jason Leigh, "Overcoming Time-Zone Differences and Time Management Problem with Tele-Immersion," Proceedings of INET 2000, Yokohama, Japan, July 18-21, 2000, published by Internet Society (ISOC). (Accepted for publication) [http://www.startap.net/PUBLICATIONS/pubs.html#Application Papers].

B.5. 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. The upgrading of Saranav to CAVERNsoft G2 is complete. The first virtual walk-through of architect Rem Koolhaas' IIT design was demonstrated by Jason Leigh and student Chris Scharver, June 2, at SARA.
- Working with SARA in The Netherlands to experiment with an EVL-designed packet-level Forward Error Correction scheme.

D. Summary of Award Expenditures (May)

The spending rate is within budget.