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www.startup.net/translight

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1. Participants

1.A. Primary Personnel

Participant's Name(s)	Project Role(s)	>160 Hours/Yr
Thomas A. DeFanti (1)	Principal Investigator	Yes
Maxine Brown (2)	Co-Principal Investigator	Yes

- (1) Tom DeFanti, PI, receives one-month funding and primarily focuses on managing the link procurement process, network engineering, budgets and accounts payable, and interfaces with personnel from Internet2/Abilene and DANTE/GÉANT2. DeFanti also participates in monthly IRNC phone calls and attends meetings as time permits.
- (2) Maxine Brown, co-PI, primarily focuses on managing documentation and education and outreach activities, and is responsible for TransLight/StarLight quarterly and annual reports, web pages and events planning. The co-PI also participates in monthly IRNC phone calls and attends meetings as requested.

1.B. Other Senior Personnel (Excluding PI and Co-PI)

Additional people who contributed greatly to the project, and received a salary, wage, stipend or other support from this grant:

Participant's Name(s)	Project Role(s)	>160 Hours/Yr
Alan Verlo (3)	Professional staff	Yes
Laura Wolf (4)	Professional staff	Yes
Steve Sander (5)	Professional staff	Yes
Pat Hallihan (6)	Professional staff	Yes
Lance Long (7)	Professional staff	Yes
Linda Winkler (8)	Professional staff	Yes
Rick Summerhill (9)	Professional staff	Yes
Roberto Sabatino (10)	Professional staff	Yes
Erik-Jan Bos (11)	Professional staff	Yes
Kees Neggers (12)	Other Senior Personnel	Yes
Joe Mambretti (13)	Other Senior Personnel	Yes

- (3) Alan Verlo is the TransLight/StarLight network engineer, and is a member of the StarLight engineering team. For several years, Verlo has also been a member of the SCinet committee, focusing on enabling international SC research demos that have connections in Chicago. He was also co-chair of the iGrid 2005 international cyberinfrastructure team, responsible for clusters and international networking.
- (4) Laura Wolf is the TransLight/StarLight technical writer and web developer.
- (5) Steve Sander is the TransLight/StarLight budget, accounts payable and equipment procurement person.
- (6) Pat Hallihan reports to Alan Verlo and is technical support staff.
- (7) Lance Long reports to Alan Verlo and is technical support staff.
- (8) Linda Winkler of Argonne National Laboratory, while not compensated by the University of Illinois at Chicago (UIC), serves as part-time StarLight engineer with Alan Verlo, and assists with TransLight/StarLight. For many years, Winkler has been a member of the SCinet committee, focusing on enabling international SC research demos that have connections in Chicago. She was also co-chair of the iGrid 2005 international cyberinfrastructure team, responsible for clusters and international networking.
- (9) Rick Summerhill is the Internet2 Director Network Research, Architecture, and Technologies and, while not compensated by UIC, is one of the stewards of the TransLight/StarLight link that connects Abilene at MAN LAN to GÉANT2 at their POP at the Amsterdam Internet Exchange.
- (10) Roberto Sabatino is the DANTE Chief Technology Officer and, while not compensated by UIC, is one of the stewards of the TransLight/StarLight link that connects Abilene at MAN LAN to the GÉANT2 POP at the Amsterdam Internet Exchange.
- (11) Erik-Jan Bos is the SURFnet chief network engineer and, while not compensated by UIC, is one of the stewards of the TransLight/StarLight link connecting StarLight in Chicago to NetherLight at the Amsterdam Internet Exchange in Amsterdam.
- (12) Kees Neggers is SURFnet Managing Director and a founder and current chair of GLIF. While not compensated by UIC, he does the tenders and procures both TransLight/StarLight links on UIC's behalf, and is one of the stewards of the TransLight/StarLight link connecting StarLight in Chicago to NetherLight in Amsterdam.

- (13) Joe Mambretti is the StarLight managing director and head of the International Center for Advanced Internet Research (iCAIR) at Northwestern University. While not compensated by UIC, Joe has been a strong supporter and advisor regarding our IRNC efforts. Mambretti has assisted with connectivity issues, not only at StarLight, but also at MAN LAN.

1.C. Other Organizations That Have Been Involved as Partners

Argonne National Laboratory, Mathematics and Computer Science Division

Argonne National Laboratory <www.mcs.anl.gov> has been, and continues to be, a strong supporter of US international networking activities. Linda Winkler has facilitated STAR TAP/StarLight engineering since its inception, and is the lead engineer today; her salary comes from ANL.

Northwestern University, International Center for Advanced Internet Research (iCAIR)

Joe Mambretti, director of iCAIR <www.icaair.org>, also runs the StarLight facility <www.startap.net/starlight>, and is assisting with connectivity issues, not only at StarLight, but also at MAN LAN.

SURFnet

SURFnet, the national network for research and education in the Netherlands <www.surfnet.nl>, is a TransLight/StarLight “key institutional partner,” responsible for negotiating, procuring and implementing the TransLight OC-192 circuit(s) between Open Exchanges in the USA and in Europe, which UIC pays for upon receipt of an invoice from SURFnet, as has been our practice with our previous NSF HPIIS Euro-Link award.

1.D. Other Collaborators or Contacts

CANARIE

The Canadian Network for the Advancement of Research, Industry and Education (CANARIE) <www.canarie.ca> is Canada’s advanced Internet development organization. It operates CA*net 4, a series of point-to-point optical wavelengths, most of which are provisioned at 10Gbps speeds, interconnecting Canada's provincial research networks with each other and international peer networks, and forming an innovative framework to support grids and e-Science.

DANTE

Owned by European NRENs, DANTE <www.dante.net> is an organization that plans, builds and operates pan-European networks for research and education. The GÉANT2 project is a collaboration between 26 National Research & Education Networks representing 30 countries across Europe, the European Commission, and DANTE. Its principal purpose has been to develop the GÉANT2 network -- a multi-gigabit pan-European data communications network for research and education; see <www.geant2.net>. TransLight/StarLight funding makes a 10Gbps link available to Internet2, DOE and DANTE, to connect Abilene and ESnet with the pan-European backbone, GÉANT2.

ESnet

The Energy Sciences Network, (ESnet) <www.es.net> is funded by the DOE Office of Science to provide network and collaboration services in support of the agency's research missions, serving thousands of Department of Energy scientists and collaborators worldwide. ESnet provides direct connections to all major DOE sites with high-performance speeds, as well as fast interconnections to more than 100 other networks. TransLight/StarLight funding makes a 10Gbps link available to Internet2, DOE and DANTE, to connect Abilene and ESnet with the pan-European backbone, GÉANT2.

Global Lambda Integrated Facility (GLIF)

GLIF <www.glif.is> is an international virtual organization of NRENs, consortia and institutions that promotes lambda networking. GLIF provides lambdas internationally as an integrated facility to support data-intensive scientific research, and supports middleware development for lambda networking. It brings together premier networking engineers to develop an international infrastructure by identifying equipment, connection requirements, and necessary engineering functions and services.

GLORIAD

GLORIAD, the Global Ring Network for Advanced Applications Development, <www.gloriad.org> is currently

constructing a dedicated lightwave round-the-world link connecting scientific organizations in the United States, Russia, China, Korea, Canada, the Netherlands and the Nordic countries.

Internet2

Internet2 <www.internet2.edu> is a consortium of leading US research universities working in partnership with industry and government to develop and deploy advanced network applications and technologies. Abilene <<http://abilene.internet2.edu>> is an Internet2 high-performance backbone network that enables the development of advanced Internet applications and the deployment of leading-edge network services to Internet2 universities and research labs across the country. TransLight/StarLight funding makes a 10Gbps link available to Internet2, DOE and DANTE, to connect Abilene and ESnet with the pan-European backbone, GÉANT2.

National LambdaRail (NLR)

NLR <www.nlr.net> is a major initiative of US research universities and private sector technology companies to provide a national-scale infrastructure for research and experimentation in networking technologies and applications. TransLight/StarLight considers itself, in part, to be the international extension of NLR, and wants to encourage data-intensive e-science drivers needing gigabits of bandwidth to use NLR and international links for schedulable production services not available with “best effort” networks.

TransLight/Pacific Wave

TransLight/Pacific Wave <www.pacificwave.net/participants/irnc> is developing a distributed exchange facility on the West Coast (currently in Seattle, Sunnyvale, and Los Angeles) to allow interconnection of international research and education networks with US research networks.

2. Activities and Findings

2.A. Research Activities

2.A.1. Accomplishments and Milestones

We have been working on the following activities during the third quarter of year 2 of the grant:

- Working on a new TransLight/StarLight website, to be completed this Fall
- Provisioning 1Gbps links on TransLight/StarLight CHI/AMS for demanding applications (DRAGON/eVLBI, GLORIAD, LHC/CERN and OptIPuter/GLVF)
- Provisioning 3Gbps on TransLight/StarLight CHI/AMS for GLORIAD
- Giving presentations on TransLight/StarLight at major conferences and workshops; participating in network engineering JET and GOLE meetings
- Continuing to identify and develop production applications on both IRNC circuits.

2.A.2. Infrastructure

Topology

CHI/AMS...No updates.

NYC/AMS...Internet2 and GÉANT2 want to replace DANTE's router at MAN LAN with an Alcatel switch, but are still experiencing interoperability problems between the Alcatel and the Nortel OME6500.

PoP Connectivity and Peering

On September 11, 2006, Internet2 announced that DANTE enables Internet2 and TransLight/StarLight network users to reach India's Education and Research Network (ERNET) via GÉANT2's new 45Mbps link to India <www.ernet.in>. This link is operated by DANTE and funded by the European Commission which connects ERNET with GÉANT2. <<http://members.internet2.edu/newsletter.cfm?date=2006-09-01#681>>

National LambdaRail has received several inquiries from US institutions that want to use their NLR connections to connect with European collaborators via GÉANT2. On October 11, 2006, Tom West, NLR CEO, sent a request to Dai Davies, DANTE General Manager, to initiate peering.

Lightpath Services

We are provisioning 1 or more Gbps links between Chicago and Amsterdam in support of production science for several projects. We will first provide VLANs, but can provision as dedicated connections.

- **DRAGON...** 1GE VLAN has been provisioned. SURFnet provisioned another GE on their AMS/CHI route so the project has a redundant path.
- **GLORIAD...** 3Gbps VLAN provisioning in progress.
- **Large Hadron Collider/CERN...** Under discussion.
- **OptIPuter/Global Lambda Visualization Facility (GLVF)...** Under discussion.

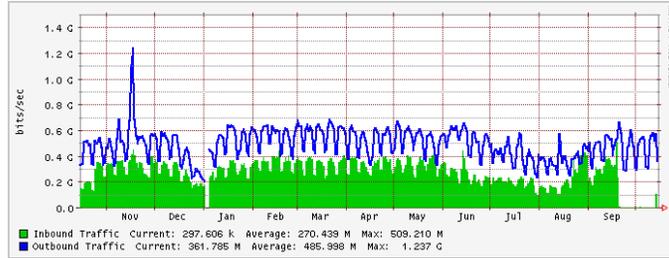
2.A.3. NYC/AMS Network Operations and Engineering

Usage

NYC/AMS...Internet2 statistics of Abilene/GÉANT2 peering at MAN LAN are available at: <<http://stryper.uits.iu.edu/abilene/summary.cgi?network=nycm-geant-newyork&data=bits>>.

GÉANT2 statistics are password protected; they are located at: <http://stats.geant.net/cgi-bin/cricket-1.0.2/grapher.cgi?target=%2Fbandwidth%2Fny1.ny.geant.net%2Fso-7_0_0:list-single-target=so-7_0_0:ranges=d%3Aw:view=Aggregate>

Note: DANTE recently migrated this tool to a new machine and Brown's login no longer works. DANTE is investigating.

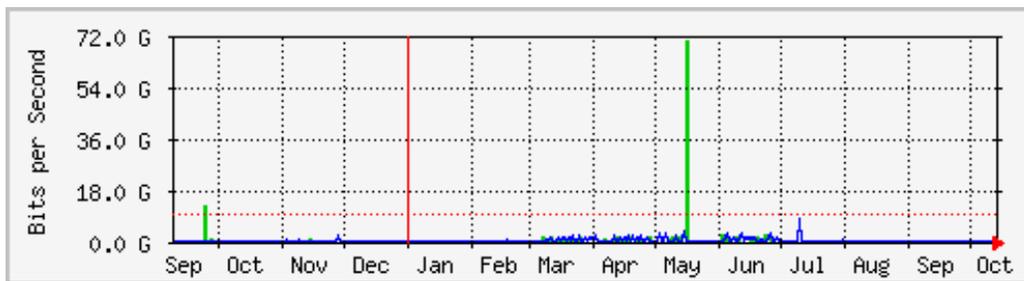


The Internet2 MRTG yearly graph of TransLight/StarLight NYC/AMS usage

CHI/AMS...L1 links cannot be monitored for usage, however the IRNC CHI/AMS link goes from the NetherLight HDXc into a Nortel ERX 8600 Layer-2 switch owned by the University of Amsterdam (UvA); statistics are at: http://trafficlight.uva.netherlight.nl/cricket/grapher.cgi?ranges=d%3Aw;target=%2Fnortel%2Finterface%2Ften_ga_eth_8_3;view=octets.

Similarly, the IRNC CHI/AMS link goes from the StarLight HDXc into the StarLight Force10, for which MRTG usage diagrams are available. These graphs can be found at: http://starlsd.sl.startap.net/mrtg/206.220.241.244_tengigabitethernet_1_1.html.

Note: SURFnet informed us that there is confusion at their end about the circuit IDs for the SURFnet link and the IRNC TransLight/StarLight link, as to which circuit is which. This will hopefully be resolved shortly.



StarLight MRTG yearly graph of IRNC CHI/AMS usage is on the right.

RENOG: Global NOC-NOC Communications

No updates.

Measurement Tools

StarLight has a NDT server (ndt.sl.startap.net), an iperf server (iperf.sl.startap.net) with BWCTL software (bwctl.sl.startap.net) <Bandwidth Test Controller: <http://e2epi.internet2.edu/bwctl/>>, and an OWAMP server (owamp.sl.startap.net) (One-way Ping: <http://e2epi.internet2.edu/owamp/>).

Verlo will install the new network diagnostic tool Pathdiag <<http://www.psc.edu/networking/projects/pathdiag/>>, which is part of the NFS-funded Network Path and Application Diagnosis (NPAD) project at PSC and NCAR.

Verlo is also investigating Internet2's new perfSONAR tool <<http://www.perfsonar.net/>> in partnership with CANARIE to see if it will be a useful GLIF GOLE resource.

Services, Performance, Security, etc.

TL1 Toolkit...The first public release and full documentation are available at <<https://noc.sara.nl/nrg/TL1-Toolkit/>>.

Network Description Language...SARA and the University of Amsterdam will demonstrate the Network Description Language <www.science.uva.nl/research/sne/ndl> at SC|06. The goal of NDL is to provide a shared common vocabulary that describes networks to facilitate the multi-domain provisioning of lightpaths.

2.A.4. Meeting and Conference Participation

TransLight/StarLight principals have participated in the following meetings and conferences to promote IRNC:

October 24-25, 2006. Tom DeFanti and Maxine Brown will participate in the IRNC Program Review at NSF in Arlington, Virginia.

October 23-24, 2006. Joe Mambretti will represent IRNC TransLight/StarLight at the US LHC Working Group Meeting at Fermilab <<https://indico.fnal.gov/conferenceDisplay.py?confId=417>>.

October 18, 2006. Alan Verlo and Linda Winkler will participate in a monthly phone call of network engineers from the major GLIF Open Lambda Exchanges (GOLEs) worldwide.

October 17, 2006. Alan Verlo and Linda Winkler will participate in the monthly JET meeting at NSF.

October 11-13, 2006. Linda Winkler and Jan Eveleth (PNWGP) attended The Quilt meeting in St. Louis, Missouri. Winkler gave a presentation on “StarLight, a GLIF GOLE” and Eveleth gave a presentation on “TransLight” <<http://www.thequilt.net/meetings/Oct-06-wksp/oct06mtg.html>>.

October 10, 2006. Maxine Brown participated in a phone meeting with John Silvester, Jacqueline Brown and George McLaughlin to identify TransLight/Pacific Wave and TransLight/StarLight applications.

October 1-5, 2006. Xi Wang (UIC/EVL postdoc) attended Broadnets 2006 and gave the paper “LambdaBridge: A Scalable Architecture for Future Generation Terabit Applications.”

October 1-2, 2006. Eric He (UIC/EVL PhD candidate) attended GridNets 2006 and gave the paper “Flexible Advance Reservation Model for Multi-domain WDM Optical Networks.”

September 26, 2006. Tom DeFanti participated in the monthly NSF IRNC phone call.

September 26-28, 2006. Maxine Brown attended the 23rd annual NORDUnet meeting in Gothenburg, Sweden, and gave the paper “TransLight/StarLight and the OptIPuter.”

September 25, 2006. EVL PhD student Eric He successfully defended his dissertation today: *A Flexible Advance Reservation Model for Multi-Domain WDM Optical Networks*. He’s Photonic InterDomain Negotiator (PIN) research received major funding from NSF, and the NSF HPIIS Euro-Link connection between Chicago and Amsterdam was used for development and testing.



September 19, 2006. Larry Smarr represented IRNC TransLight/StarLight (Tom DeFanti was in The Netherlands) to host a visit by Makoto Nagao of NiCT, Japan, to UCSD/Calit2. Dr. Nagao was interested in learning more about US networking, applications, etc.

September 17-18, 2006. Tom DeFanti is a member of the SURFnet Scientific Advisory Committee and went to Utrecht, The Netherlands, to attend their annual meeting.

September 13, 2006. Tom DeFanti gave a presentation on “OptIPuter” at the Global Lambda Networking Symposium in Tokyo, Japan <<http://www.e-side.co.jp/glifsymposium2006/program.html>>.

September 11-12, 2006. Tom DeFanti, Maxine Brown, Alan Verlo and Linda Winkler attended the Global Lambda Integrated Facility (GLIF) meeting in Tokyo, Japan. The GLIF TECH Working Group discussed infrastructure and GLIF Open Lambda Exchanges; DeFanti, Verlo and Winkler participated. The GLIF Research & Applications (RAP) Working Group, co-chaired by Larry Smarr and Maxine Brown, focused on OptIPuter-type global applications and LambdaVision/SAGE developments.

September 7-8, 2006. Tom DeFanti and Maxine Brown attended the Optical Network Testbeds 3 Workshop (ONT3) in Tokyo, Japan. DeFanti gave a keynote presentation on “Applications over Next-Generation Global Optical Networks,” and presented “OptIPuter” in a panel discussion. Brown is giving a presentation on “TransLight/StarLight.” <www.nren.nasa.gov/workshop9>

August 18, 2006. Maxine Brown attended a one-day planning meeting at NCSA at the University of Illinois at Urbana-Champaign on the NSF Petascale solicitation, representing visualization and networking interests. NCSA has formed the Great Lakes Consortium for Petascale Computation (UIC is a member) and was soliciting input.

August 15, 2006. Alan Verlo and Linda Winkler participated in the monthly JET meeting at NSF.

2.B. Research Findings

2.B.1. Research Findings for Current Quarter

E-Science Application Identification and Support

John Silvester recently formed a small group to identify and provide support for TransLight/Pacific Wave applications, and recently invited Maxine Brown to join the discussions, to expand coverage to the entire TransLight project. Many projects, such as eVLBI and SDSS, span Asia, North America and Europe.

E-Science Support (Quantified Science Drivers) Using IRNC-funded links

International collaborations are prevalent, collaborations include two or more continents, and more transoceanic links are becoming operational, so it is impossible to identify and document these applications – they are ubiquitous. Of interest to us, is to identify and serve high-end applications – that is, the data-intensive e-science applications requiring advanced networking capabilities – for they are the drivers for new networking tools and services to advance the state-of-the-art of production science. The following notable applications using the TransLight/StarLight CHI/AMS link took place in the preceding months.



© ANDRILL
Photo by Diane Wirtler

ANDRILL (Antarctic geological Drilling) Program

www.andrill.org

Collaborators

ANDRILL Science Management Office, Department of Geosciences, University of Nebraska-Lincoln; Department of Geology and Environmental Geosciences, Northern Illinois University; USA

ANDRILL Operations Management Office, Antarctica New Zealand; Department of Geology, University of Otago; Institute of Geological and Nuclear Sciences; New Zealand

Istituto Nazionale di Geofisica e Vulcanologia; Dipartimento di Scienze della Terra, Università Degli Studi di Siena; Italy

Alfred Wegener Institute for Polar and Marine Research; Germany
School of Earth Sciences, University of Leeds; UK

ANDRILL is an international research program that represents a partnership between the US, NZ, Germany and Italy, with the UK participating in an advisory role for the present. New Zealand is a major partner in this drilling effort and is providing the drilling system and operational support for the project.

Given that New Zealand now has an R&E network to Seattle (KAREN), ANDRILL is interested in making drilling data available to other researchers while the core-drilling ships are still out to sea in the Antarctic. They want to fly small data storage drives to Otago University in New Zealand, where the data will be sent via KAREN to Seattle so schools on Abilene and NLR can access it. Maxine Brown and John Silvester e-introduced the ANDRILL and KAREN teams, and all are willing to try this experiment once the University is connected to KAREN (imminent).

Brown inquired whether ANDRILL had similar, or more network-intensive, projects they wanted to try with their European colleagues.



DRAGON Update

Alan Verlo has configured StarLight's Calient switch for use by the DRAGON project. A demonstration at SC|06 is being planned.



EnLIGHTened Computing

www.enlightenedcomputing.org

Collaborators

North Carolina State University; Renaissance Computing Institute at UNC Chapel Hill; MCNC; Louisiana State University; Southeastern Universities Research Association; Naval Research Lab, National LambdaRail, US

National Institute of Advanced Industrial Science and Technology (AIST); KDDI R&D Laboratories; NTT Network Innovation Laboratories; National Institute of Information and Communications Technologies (NICT), Japan

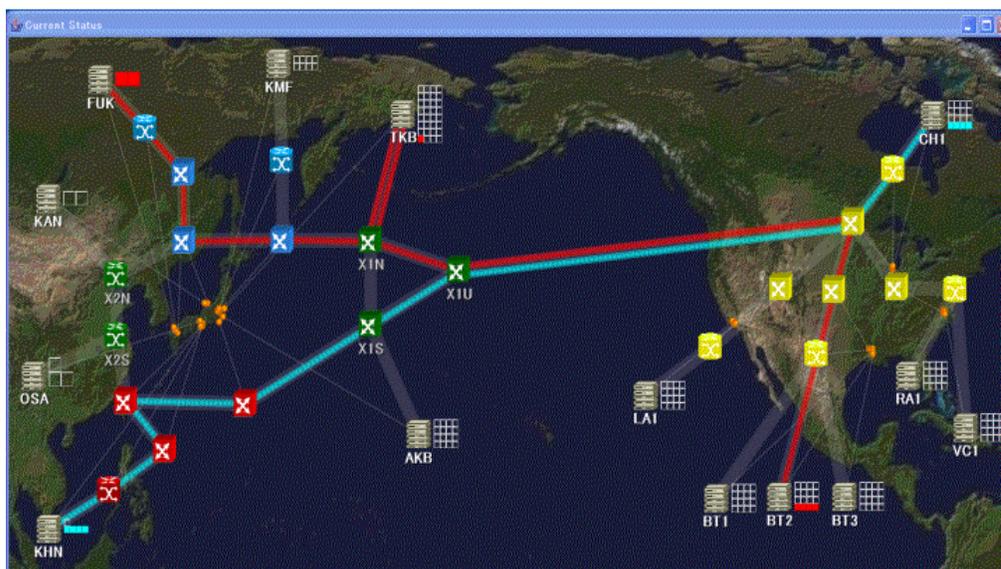


Corporate sponsors: Cisco, IBM, AT&T Research and Calient Networks

At the GLIF 2006 annual meeting in Tokyo, Japan (September 11, 2006), researchers in the US and Japan demonstrated “automated” interoperability between network and computing resources in two national grid computing research testbeds. The interoperability between the G-lambda project in

Japan and the Enlightened Computing project in the US was demonstrated. More specifically, a software application in a research testbed in one country was able to reserve, manage and monitor computing and network resources across both countries – a key milestone toward the development of a Global Grid of networked, interoperable resources.

Researchers working with the G-lambda group in Japan and the Enlightened Computing group in the United States demonstrated how software applications can establish network connections “on demand” to computing resources, databases of information and scientific instruments. The duration of these connections is based on the particular application’s requirement for precisely the amount of time that is needed, and no more. Whether seconds or days, the network and resources are connected and managed to perform a task. Then, the connection is released in order to share resources for other purposes.



Note: The demonstration included computing resources in the US at the N.C. State University Virtual Computing Lab and MCNC in North Carolina, the Center for Computation & Technology at Louisiana State University, the California Institute of Technology (Caltech), and StarLight facility in Chicago. Alan Verlo configured the StarLight Calient for use in this project. And, while this particular demonstration did not involve Europeans, the EnLIGHTened Project has European collaborators.

International High Performance Digital Media With Dynamic Optical Multicast

Collaborators

International Center for Advanced Internet Research/Northwestern University; Center for Computation and Technology (CCT), Louisiana State University (LSU); US Nortel, Canada

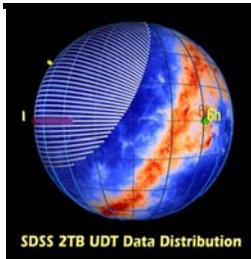
Masaryk University, Czech Republic

With support from StarLight (US); NetherLight (The Netherlands); CzechLight (Czech Republic)

Note: GLORIAD is also interested in participating in the future.

This high-definition optical multicast demonstration is being developed for SC|06, and is helping prepare an optical transport foundation for a computational science class that will be offered in January at LSU with participants from Masaryk University in the Czech Republic. Several configurations will be demonstrated:

- Dynamic Optical Multicast at Layer 1
- Multicast Layer 2



TeraFlow Project Update

www.ncdm.uic.edu

GLORIAD has expressed interest in having its Russian partners participate in the Teraflow Project now that the US and Russia will have several gigabits of bandwidth between Chicago and Moscow. Bob Grossman and Joe Mambretti are currently configuring the next version of the nodes, and will work with Natasha Bulashova to identify locations in Moscow where these nodes can be placed.

2.B.2. Plans for the Coming Quarter (Quarterly Reports Only)

TransLight/StarLight plans for the fourth quarter, November 1, 2006 – January 31, 2007, include:

- Complete new TransLight/StarLight website
- Complete provisioning of GLORIAD link
- Continue to represent TransLight/StarLight at major conferences and workshops; and, continue to participate in network engineering JET and GOLE meetings
- Continue working to identify and develop production applications on both circuits.
- Assist with SC|06 demonstrations, as needed.

2.C. Research Training

National Research Network (NRN) management and engineers from Internet2, ESnet, DANTE and NLR work closely with IRNC management and engineers at UIC and SURFnet, as well as at MAN LAN, StarLight, and NetherLight, to facilitate connectivity and greater advances in global networking than a single-investigator effort would afford. In addition, numerous researchers, middleware developers, network engineers and international NRNs are involved as users of TransLight/StarLight. This global, dedicated community has elected to work together, on a persistent basis, to further the goals of international e-science collaboration.

2.D. Education/Outreach

TransLight/StarLight's primary education and outreach activities include web documentation, journal articles, and conference presentations and demonstrations. We also provide PowerPoint presentations and other teaching materials to collaborators to give presentations at many conferences, government briefings, etc.

Since 1986, EVL has partnered with NCSA, ANL, and more recently NU/iCAIR, in ongoing efforts to develop national/international collaborations at major professional conferences, notably ACM/IEEE Supercomputing (SC), IEEE High Performance Distributed Computing (HPDC), and Internet2 meetings. We have participated in European conferences (e.g., GLIF/LambdaGrid Workshops), NORDUnet annual meetings and a UKERNA seminar on optical networking. Our success has been in the development of teams, tools, hardware, system software, and human interface models on an accelerated schedule to enable multi-site collaborations for complex problem solving.

We organized the iGrid 2005 in San Diego in September 2005, and participate in the annual SC conferences to promote the goals of IRNC and TransLight/StarLight.

3. Publications and Products

3.A. Journals/Papers

Xi Wang, Venkatram Vishwanath, Byungil Jeong, Ratko Jagodic, Eric He, Luc Renamnot, Andrew Johnson, Jason Leigh, "LambdaBridge: A Scalable Architecture for Future Generation Terabit Applications," Optical Communications, Networks and Systems Symposium held at BroadNets 2006: 3rd International Conference on Broadband Communications, Networks and Systems <www.broadnets.org/2006>, sponsored by IEEE Communications Society/Create-Net, October 1-5, 2006, San Jose, CA, papers available via IEEE Xplore. <<http://www.evl.uic.edu/core.php?mod=4&type=3&indi=307>>

Eric He, Xi Wang, Jason Leigh, "Flexible Advance Reservation Model for Multi-domain WDM Optical Networks," GridNets 2006: 3rd International Workshop on Networks for Grid Applications, (co-located with BroadNets) <<http://gridnets.org/2006>>, October 1-2, 2006, San Jose, California. <<http://www.evl.uic.edu/core.php?mod=4&type=3&indi=305>>

3.B. Books/Publications

Eric He, A Flexible Advance Reservation Model for Multi-Domain WDM Optical Networks, PhD dissertation, Electronic Visualization Laboratory, Computer Science Department, University of Illinois at Chicago, 2006.

3.C. Internet Dissemination

www.startap.net/translight

3.D. Other Specific Products

Other than the information reported here, we have not developed any other specific product of significance.

4. Contributions

4.A. Contributions within Discipline

TransLight/StarLight, by its very nature, is interdisciplinary. There is clearly a fine team of computer scientists, computational scientists and networking engineers involved with TransLight/StarLight, facilitating greater advances in global networking than single-investigator efforts could produce. TransLight/StarLight developed its management team in the Chicago area (UIC/EVL), and leverages the efforts of national networking group (Internet2, ESnet and NLR) and foreign NRN (DANTE and SURFnet) technical and administrative contacts.

4.B. Contributions to Other Disciplines

Within the Computational Science and the Computer Science communities, TransLight/StarLight efforts help lead 21st century discipline science and computer science innovation. TransLight's OC-192 L3 circuit among Abilene, ESnet and GÉANT2 provides greater transatlantic connectivity, and the OC-192 L2 circuit between StarLight and NetherLight provides a unique infrastructure to study the effects of long-distance, high-bandwidth networks on advanced applications.

4.C. Contributions to Human Resource Development

We promote TransLight/StarLight through web documentation, journal articles, demonstrations and presentations at major networking conferences (e.g., Supercomputing, HPDC), PowerPoint presentations and other instructional material. We teach the infrastructure, the grid advancements, the technological innovations and the application advancements that global connectivity enables. In fact, thanks to previous NSF funding of STAR TAP, StarLight and Euro-Link, we have a mailing list of ~1,000 <stars@startup.net> individuals, from academia, government and industry, interested in information about international advanced networking developments.

4.D. Contributions to Resources for Research and Education

TransLight/StarLight is a necessary and integral part of application advances and technological innovations for the Computational Science and Computer Science communities, as well as of major interest to network engineers. In particular, the L2 TransLight/StarLight circuit between StarLight and NetherLight is part of the GLIF LambdaGrid fabric and represents a major resource for science and technology.

4.E. Contributions Beyond Science and Engineering

Because of TransLight/StarLight's interest in advanced applications and light-path provisioning, we often get inquiries from network equipment manufacturers and telecommunication providers about partnering with us to create and showcase a marketplace for wavelength-based network services and products. We look forward to working with these companies and introducing them to the Nation's foremost university and Federal laboratory networking engineers, computer programmers and applications scientists, who are developing and using today's evolving grid technologies. Our users expect us to grow in capacity and sophistication, and we look forward to the engineering challenges ahead.

5. Special Requirements

5.A. Objectives and Scope

A brief summary of the work to be performed during the next year of support if changed from the original proposal.
Our scope of work has not changed.

5.B. Special Reporting Requirements

Do special terms and conditions of your award require you to report any specific information that you have not yet reported?
No.

5.C. Animals, Biohazards, Human Subjects

Has there been any significant change in animal care and use, biohazards, or use of human subjects from what was originally approved (or approved later)?
No.