TransLight / StarLight

NSF Cooperative Agreement OCI-0441094
www.startap.net/translight

QUARTERLY REPORT May 1, 2010 – July 31, 2010
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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, focuses on managing the link procurement process, network engineering, budgets and accounts payable, interfacing with personnel from Internet2, ESnet, NLR and DANTE/GÉANT2, coordinating project management and oversight activities with the NSF, and performing day-to-day project management. He participates in regularly scheduled IRNC phone calls and attends meetings as requested.

(2) Maxine Brown, co-PI, focuses on managing documentation and education and outreach activities, and is responsible for TransLight/StarLight quarterly and annual reports, web pages and events planning. She also participates in regularly scheduled IRNC phone calls and attends meetings as requested.

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

Additional people who contribute greatly to the project are listed below. While some receive a salary from this grant, others provide in-kind services:

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
Patrick 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 many years Verlo has also been a member of the SC conferences' SCinet committee, focusing on enabling international SC research demos that have network connections at StarLight in Chicago. He was also co-chair of the iGrid 2005 international cyberinfrastructure team, responsible for clusters and international networking. Verlo regularly participates in JET and GLIF Tech meetings.

(4) Laura Wolf was responsible for TransLight/StarLight technical writing and web documentation; she left UIC in August 2009 for a position at Argonne National Laboratory.

(5) Steve Sander is the TransLight/StarLight budget, accounts payable and equipment procurement person.

(6) Patrick 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 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, helping enable international SC research demos with network connections at StarLight in Chicago. She was also co-chair of the iGrid 2005 international cyberinfrastructure team, responsible for clusters and international networking.

(9) Rick Summerhill was the Internet2 Chief Technology Officer and, while not compensated by UIC, was one of the stewards of the TransLight/StarLight link that connects the Internet2 network at MAN LAN to the GÉANT2 POP at the Amsterdam Internet Exchange. Summerhill retired June 2009.

(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 the Internet2 network at MAN LAN to the GÉANT2 POP at the Amsterdam Internet Exchange.

(11) Erik-Jan Bos is SURFnet Chief Technology Officer. While not compensated by UIC, he is one of the stewards of the TransLight/StarLight link connecting StarLight in Chicago to NetherLight 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, he 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
Argonne National Laboratory's Mathematics and Computer Science Division (MCS) <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 network engineering since its inception, and continues to serve as a senior engineer today; her salary comes from Argonne.

Northwestern University
Joe Mambretti, director of Northwestern's International Center for Advanced Internet Research (iCAIR) <www.icair.org>, also runs the StarLight facility <www.startap.net/starlight>, and assists with connectivity issues.

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 US and in Europe, which UIC pays for upon receipt of an invoice from SURFnet, as has been our practice since 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 the CANARIE Network, 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, the DANTE <www.dante.net> organization plans, builds and operates pan-European networks for research and education. The GÉANT2 project is a collaboration among 30 National Research & Education Networks representing 34 countries across Europe, the European Commission, and DANTE. Its principal purpose is to develop the GÉANT2 network -- a multi-gigabit pan-European data communications network for research and education <www.geant2.net>. TransLight/StarLight funding provides a 10Gbps routed infrastructure to connect the Internet2 network, NLR PacketNet and DOE/ESnet with DANTE/GÉANT2. TransLight/StarLight also makes a 10Gbps switched infrastructure available for use.

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

DOE 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 provides a 10Gbps routed infrastructure to connect the Internet2 network, NLR PacketNet and DOE/ESnet with DANTE/GÉANT2. TransLight/StarLight also makes a 10Gbps switched infrastructure available for use.

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 constructing a dedicated lightwave round-the-world connecting scientific organizations in the US, Russia, China, Korea, Canada, the Netherlands and the Nordic countries. GLORIAD currently has 3x1Gbps VLANs on the TransLight/StarLight CHI/AMS link to NetherLight. Russia, a GLORIAD partner, connects to NetherLight in Amsterdam from Moscow via Stockholm.

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. In Spring 2007, the new Internet2 network <www.internet2.edu/network/>, a hybrid optical and packet network designed in collaboration with Level 3 Communications, came online. TransLight/StarLight funding provides a 10Gbps routed infrastructure to connect the Internet2 network, NLR PacketNet and DOE/ESnet with DANTE/GÉANT2. TransLight/StarLight also makes a 10Gbps switched infrastructure available for use by Internet2, initially the Internet2-DCN (Dynamic Circuit Network) and now the Internet2-ION (Interoperable On-demand Network).

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 encourages data-intensive e-science drivers needing gigabits of bandwidth to use NLR FrameNet and international links for schedulable production services not available with "best effort" networks. TransLight/StarLight funding provides a 10Gbps routed infrastructure to connect the Internet2 network, NLR PacketNet and DOE/ESnet with DANTE/GÉANT2. TransLight/StarLight also makes a 10Gbps switched infrastructure available for use by NLR FrameNet.

TransLight/PacificWave
TransLight/PacificWave <www.pacificwave.net/participants/irnc> is an IRNC-supported distributed exchange facility on the West Coast (in Seattle, Sunnyvale, and Los Angeles) to allow interconnection of international research and education networks with US research networks. TransLight/PacificWave is the sister project to TransLight/StarLight.

2. Activities and Findings

2.A. Research Activities

2.A.1. Accomplishments and Milestones

In Year 6 (from February 1, 2010 – July 1, 2010), TransLight/StarLight continued to fund two international circuits, which were both delivered July 2005: an OC-192 routed connection between MAN LAN in New York City and NetherLight at the Amsterdam Internet Exchange (AMS-IE) connecting the US Internet2, NLR and ESnet networks to GÉANT2, and an OC-192 switched connection between StarLight in Chicago and NetherLight that is part of the GLIF fabric. These links were procured and operated by SURFnet.

Starting July 1, 2010, Indiana University, which received an IRNC #2 award for US/European connectivity, signed an MOU with SURFnet to keep these circuits in place until such time as Indiana could tender and procure its own circuits to Europe.

We have been working on the following activities during the second quarter of Year 6 of the grant:

- Preparing the TransLight/StarLight quarterly report
- Provisioning VLANs on TransLight/StarLight CHI/AMS for e-science applications
- Representing TransLight/StarLight at major conferences and workshops as members of the program committee and/or as participants
- Identifying and assisting applications on both IRNC circuits
- Continuing to update the TransLight/StarLight website <www.startap.net/translight>
- Continuing to contribute to the GLIF applications website <www.glif.is/apps>
- Continuing preparations for GLIF and SC'10 international application demonstrations

The original IRNC (heretofore referred to as IRNC #1) was a five-year program. TransLight/StarLight was initally funded for the period February 1, 2009 – January 31, 2010. As NSF was unable to complete reviews for its follow-on, five-year IRNC program (IRNC #2), we were asked to request a supplement for two months (through March 31, 2010), to continue to provide the US research and education community with international networks and services until such time as NSF OCI could support the IRNC #2 program.

Given this supplement was for 2 months of support, or 1/6th of a year, we essentially took previous annual budgets and requested 1/6th the amount in most categories (e.g., salaries, travel, telecommunications costs, etc). We received $167,000, awarded January 14, 2010, for a six-month period, to end July 31, 2010.

Given that this supplement had $90,000 to extend production networking for several months, and given that we were not awarded an IRNC:ProNet grant, we asked NSF's permission to reallocate this money to other categories, particularly to cover salaries as we scale down operations, and to provide a one-year extension, so that the award would end July 31, 2011. Alan Blatecky of NSF granted both the rebudget and the no-cost extension requests.

These funds will primarily be applied to salaries for the co-principal investigators and network engineer, with some funding for administration and web documentation, plus some travel, as we transition the operation of our US/Europe circuits to the new IRNC:ProNet awardee, document user applications and requirements, participate in network-relevant workshops and meetings, and begin ramping up our new IRNC #2 Experimental Networking award.

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

PoP Connectivity and Peering

No updates to report.

Usage

No updates to report.

Routing Policies

No updates to report.

Peering Policies

No updates to report.

Security

No updates to report.

Engineering

No updates to report.

NOC Operations

No updates to report.

RENOG

No updates to report.

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

PoP Connectivity and Peering

No updates to report.

Usage

No updates to report.

Routing Policies

No updates to report.

Peering Policies

No updates to report.

Security

No updates to report.

Engineering

No updates to report.

Engineering: LightPath Services

No new VLANs on the TransLight/StarLight CHI/AMS were requested this quarter.

NOC Operations

No updates to report.

2.B. Research Findings

2.B.1. E-Science Application Organizing and Support

Tom DeFanti and Maxine Brown are involved with the following organizations and conferences:

- 10th Annual LambdaGrid Workshop, sponsored by GLIF. Maxine Brown serves as a member of the Program Committee.
- CineGrid@TIFF 2010 (Tokyo International Film Festival) is a one-day CineGrid workshop at the TIFF 2010 conference. Tom DeFanti is one of the organizers, as well as a participant.
- 5th Annual CineGrid International Workshop, sponsored by CineGrid and hosted by Calit2/ UCSD, December 12-15, 2010. Tom DeFanti is a co-organizer and member of the Program Committee.

2.B.2. E-Science Application Support (Quantified Science Drivers)

International Applications 2010

OptIPortals at CICESE and UNAM

Collaborators:

- Calit2/UCSD; PRAGMA; US
- Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE); Universidad Nacional Autónoma de México (UNAM); CUDI; Mexico

Calit2 in San Diego, and CICESE in Ensenada, collaborate on advanced visualization capabilities. CICESE is also a member of PRAGMA. CICESE has an OptIPortal display wall, but it can only support local data given its limited connectivity. The OpIPortal requires multi-gigabit connectivity to support advanced visualization.

The limited development of Mexico's telecommunications market has restricted, until recently, the availability of high-capacity links in the Baja California region. CUDI was recently able to light the fiber on the Mexican side of the Border to enable 10Gbps connectivity between Ensenada and Tijuana. Funds for the lease, last-mile fiber to the campus and equipment were provided by CICESE, UNAM and Calit2.

To benefit from the increased bandwidth on the Mexican side, the project required increasing the capacity of the existing link between Tijuana and CENIC's CalREN-HPR to 10Gbps. *Tom DeFanti at Calit2 has been instrumental in working with IRNC WHREN (now AmLight) and CENIC to upgrade this connection.*

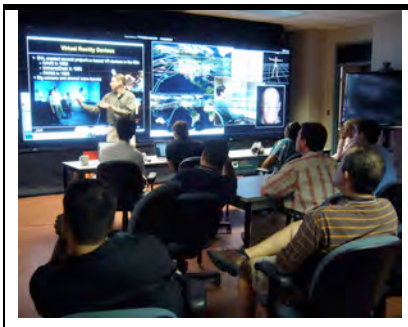
Once operational, CICESE will use the 10Gbps connection to collaborate on remote data sharing with OptIPortal partners and grid computing with PRAGMA partners in application domains such as meteorology, seismology, ocean sciences, microbiology, geophysics, and bioinformatics.

In addition, UNAM has two departments in Ensenada: the Centro de Nanociencias y Nanotecnología (CNyN), which is doing research in neural networks, electronic properties of new materials, nano-materials and nano-structures, and the Instituto de Astronomía, which is working on 3 major international projects: the Taiwan America Occultation Survey, the installation of 1.3 meter optical-infrared robotic telescope for the observation of gamma rays financed by France and China, and a 60 centimeter telescope of the Spanish Bootes network (Burst Observer and Optical Transient Exploring System) for optical and nIR observation of Gamma rays.

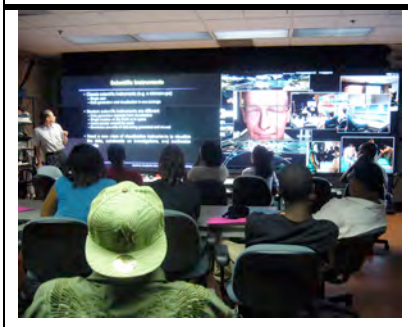
10Gbps capacity between Tijuana and CENIC will enable unprecedented scientific collaborations between Mexican, US, Asian and European institutions.

2.B.3. Education, Outreach and Broader Participation

EVL and Calit2 do a number of tours for high-school students and undergraduate students to excite them about going to college and to encourage them to pursue careers in science and/or engineering. Most tours consist of an overview presentation of collaborative research, including IRNC/GLIF activities, followed by hands-on demonstrations of advanced, networked visualization technologies. EVL and Calit2 participated in the following broader outreach activities over the past year:



July 21, 2010. Math and science high-school teachers from four midwestern states toured EVL as part of a two-week intensive University of Illinois Summer Training Institute (STI), a continuing education program offered by the Illinois Project Lead The Way (PLTW) initiative. UIC became a PLTW National Affiliate University in 2005, offering Summer Core Training Institute sessions on its Chicago and Urbana-Champaign campuses, sponsoring statewide PLTW conference and professional development activities, coordinating program implementation and recordkeeping, and maintaining the statewide Illinois PLTW program website. PLTW is the largest nonprofit provider of innovative and rigorous Science, Technology, Engineering, and Mathematics (STEM) education programs – for students, parents, volunteers, school principals, and educators.



July 9, 2010. EVL's Maxine Brown and Andy Johnson hosted 20 students from the Chicago State University Minority Engineering program. Johnson's presentation and the subsequent EVL tour was one of several activities planned by Gerald A. Smith of the UIC College of Engineering's Minority Engineering Recruitment & Retention Program (MERRP).

June 23-24, 2010. EVL participated in the UIC Conference for Chicago-area High School CS Teachers (CS4HS), which received major funding from Google, with additional support from the Chicago Computer Science Teachers Association (CSTA), Illinois Computes, and the UIC Computer Science department.

June 21-23, 2010. Maxine Brown attended the NSF Broader Impacts for Research and Discovery Summit (BIRDS), whose goal was to develop guidance materials for the NSF CISE/OCI research communities on how to integrate activities that address the NSF broader impacts review criteria into their research. Working groups met to discuss and document current/future broader impact activities and ways in which infrastructure can be established to make it easier for NSF investigators to improve the broader impacts of their work <http://toilers.mines.edu/BIRDS/index.html>.

June 18, 2010. Maxine Brown of EVL hosted a teacher and several of his students from Chicago's Austin Polytechnic High School as part of the University of Illinois Affiliate Project Lead The Way (PLTW) program. Dr. Wally Goncharoff of the UIC College of Engineering organized this PLTW trip and EVL was one of the highlights. After the tour and discussions, the teacher sent an email to Dr. Goncharoff saying, "...the effect of your tour on their imaginations and positive conception of UIC cannot be overstated."

2.B.4. Community Partnerships: Meetings and Events

TransLight/StarLight principals have participated in the following meetings and events promoting IRNC efforts.

July 15, 2010. Michael Stanton, Director of Innovation of RNP (Brazilian National Research and Education Network), had previously introduced Brazilian colleagues to SAGE software and tiled display systems; however, this was his first trip to Chicago and he took the opportunity to visit StarLight and EVL, to better understand our technologies and activities so that he can better identify researchers in Brazil to be collaborators.

July 13, 2010. Tom DeFanti, Maxine Brown and Joe Mambretti attended the NSF OCI IRNC Kick-Off meeting in Arlington, VA. DeFanti gave a presentation on the new "TransLight/StarLight" award.

July 13, 2010. Alan Verlo participated in the JET meeting held at Joint Techs.

July 11-15, 2010. Alan Verlo attended the Summer 2010 ESCC/Internet2 Joint Techs in Columbus, OH.

June 24-25, 2010. Maxine Brown participated in the NSF-funded study, Opening Science Gateways to Future Success <http://www.sciencegateways.org/>. Specifically, she participated in the "Future Opportunities" focus group, held in Chicago, whose purpose was to identify future opportunities for science and engineering gateways that would warrant funding from NSF. Brown stressed the need for high-resolution "OptIPortal" gateways connected to high-speed networks.

June 15, 2010. Alan Verlo participated in a JET meeting.

June 8, 2010. Luc Renambot of EVL hosted Professor Ramon Fernando da Cunha (Rector) and Professor Paula Casari Cundari (Director of International Affairs Office) from Universidade Feevale (Feevale University) in Porto Alegre, Brazil. They visited UIC to discuss an international partnership, and since one of the academic areas they wanted to pursue is visual arts, UIC organized a tour of EVL.

May 26, 2010. Maxine Brown met with principals of Agilent, including the CTO, who visited UIC to learn about key technology areas. One such area was measurement informatics and the characterization of very-high rate streams and/or volumes of data for processing and display. Brown gave a short presentation on StarLight and EVL networked visualization research.

May 18, 2010. Alan Verlo participated in a JET meeting.

May 13, 2010. Glenn Ricart, NLR Executive Director, visited Joe Mambretti, Linda Winkler and Maxine Brown at StarLight.

May 11-12, 2010. Maxine Brown attended the NLR Spring 2010 All Hands Meeting in Indianapolis.

2.B.5. Plans for the Coming Quarter

TransLight/StarLight plans for August 1 – October 31, 2010, include:

- Continue provisioning VLANs on TransLight/StarLight CHI/AMS for e-science applications
- Continue representing TransLight/StarLight at major conferences and workshops
- Continue identifying and developing production applications on both IRNC circuits
- Continue updating the TransLight/StarLight website
- Continue to contribute to the GLIF applications website
- Provide appropriate support for successful networked demonstrations at GLIF 2010
- Continue preparations for SC'10 international demonstrations

2.C. Research Training

National Research & Education Network (NREN) management and engineers from Internet2, ESnet, NLR and DANTE 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 can afford. In addition, numerous researchers, middleware developers, network engineers and international NRENs 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, articles, and conference presentations and demonstrations. We also provide PowerPoint presentations and other teaching materials to collaborators to give presentations at conferences, government briefings, etc.

EVL has partnered with NCSA and ANL since 1986, with NU/iCAIR since 1994, and with Calit2/UCSD since 2000, in ongoing efforts to develop national/international collaborations at major professional conferences, notably ACM/IEEE Supercomputing (SC), IEEE High Performance Distributed Computing (HPDC), Internet2 Member Meetings and GLIF Workshops. We have participated in European conferences, 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 participate in the annual GLIF workshop and SC conference, and have participated in AAAS 2008 and 2009, to promote the goals of IRNC and TransLight/StarLight. We also organized the iGrid 2005 in San Diego in September 2005 to showcase international advanced applications and middleware developments.

3. Publications and Products

3.A. Journals/Papers

None.

3.B. Books/Publications

Joe Mambretti, Tom DeFanti, Maxine Brown, "StarLight: Next-Generation Communication Services, Exchanges, and Global Facilities" (chapter), Advances in Computers, Vol. 80, Marvin V. Zelkowitz (editor), Elsevier, 2010, pp 191 - 207, doi: 10.1016/S0065-2458(10)80005-1

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 can afford. TransLight/StarLight developed its management team in the Chicago area (UIC/EVL), and leverages the efforts of its IRNC partners (particularly TransLight/PacificWave, GLORIAD and WHREN-LILA), and technical and administrative contacts at national NRENs (Internet2, ESnet and NLR) and foreign NRENs (DANTE and SURFnet).

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/StarLight's 10Gbps routed circuit connecting Internet2, NLR, ESnet and GÉANT2 provides greater transatlantic connectivity, and the 10Gbps switched circuit between StarLight and NetherLight provides long-distance, high-bandwidth capability for demanding data-intensive e-science applications.

4.C. Contributions to Human Resource Development

We promote TransLight/StarLight through web documentation, articles, demonstrations and presentations at major networking conferences (e.g., SC, HPDC, Internet2), workshops (GLIF, PFLDNet), scientific conferences (AAAS), as well as 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 current mailing list of ~400 <stars@startap.net> individuals, from academia, government and industry, interested in information about international 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 US Computational Science and Computer Science research and education communities, as well as of major interest to network engineers. In particular, the TransLight/StarLight switched 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 lightpath 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. Conference Proceedings

None.

6. Special Requirements

6.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.

6.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.

6.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.