

Dr. Harvey Newman
Dr Artur Barczyk
California Institute of Technology
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Dear Dr. Newman and Barczyk,

I am writing in strong support of your IRNC ProNet DYNESTAR proposal. This groundbreaking proposal, which will provide a unique resource for the LHC program as well as the international science community, and represents a major step in the development of international networks for research and education, will be a strong foundation for continuing our very effective partnership of the last many years.

Your team at Caltech has been widely recognized as the leader in originating, operating and managing international networks for high energy physics, creating and developing the LHC worldwide distributed computing model with CERN, and developing next-generation networks and state of the art applications for data intensive science over the last decade. The world of networks for data intensive science would be far less advanced, were it not for your concepts and developments, and the transatlantic network, services and tools you have deployed in US LHCNet and the UltraLight project.

The DYNESTAR project you are proposing, interconnecting the major Open Lightpath Exchanges in the US and Europe with a mesh of resilient circuits across the Atlantic is a natural next step in the development of international networks supporting science. By interconnecting the principal research and education networks, working with our partners to develop standards-based inter-domain circuits as well as advanced services for dynamic provisioning, monitoring and high data throughput, developing mutual backup and additional robust peering arrangements among the major networks internationally, and progressively scaling up the bandwidth in a very cost effective way, DYNESTAR will be the key to meeting the networking needs of the LHC and many other communities in data intensive science over the next five years.

The DYNESTAR proposal also references cooperating with the FENRIR proposal. NYSERNet also supports the FENRIR proposal and interaction and cooperation between the two which greatly expands the potential scientific reach of this effort. NYSERNet is also part of an NSF IRNC ProNet submission, ACE -America Connects to Europe building greater connectivity and cooperation between US exchange points and GEANT in Europe. The many dedicated research links between the United States and Europe right now operate with considerable headroom. But the Large Hadron Collider powering up imminently, and a suite of data intensive science such as Laser Interferometer Gravitational-Wave Observatory (LIGO – a global experiment on finding gravitational waves), the International Thermonuclear Experimental Reactor (ITER) in Southern France (at the cutting edge of trying to harness nuclear fusion), Grid Enabled Neurosurgical Imaging Using Simulation (GENIUS - a project to use an array of high performance computers connected by advanced networks to simulate blood flow into and from the heart to better

understand cardiovascular disease), Biomedical Research Institutions Information Technology Exchange (BRIITE), Electronic Very Long Baseline Interferometry (e-VLBI - an array of radio telescopes spread around the globe that can simultaneously observe a common radio event), the age of massive data transfer is upon us, and all these projects are essential.

The diagrams in the NYNESTAR proposal show a number of logical maps showing rich, resilient infrastructure. But physical and logical maps are not the same. *Essentially all transatlantic cables have their US terminus in New York, each with multiple optical endpoints in a number of New York City carrier facilities.* Almost all of them have an optical terminus on the 24th floor of the carrier facility at 32 Avenue of the Americas in the mandatory meet me facility adjacent to the NYSERNet collocation facility. The latter is home to the MANLAN peering fabric, and the northeast nodes for Internet2, NLR, ESNET, USLHCNet, and indeed a major node for all US national research infrastructures. Whatever the ultimate destination of a research circuit from Europe, the data flows first to New York City and then to the US destination. Various well known maps (such as that for the GLIF) showing direct connections from different locations in Europe to various locations in the United States are logical but not physical, as those connections come though New York.

Since NYSERNet's facility houses core nodes of Internet2, NLR, and ESNET, and with cross connects trivial within the NYSERNet facility, if the bandwidth landing there could easily be concentrated, as needed, in Washington, Chicago, Seattle, or indeed any other US R&E exchange point. All IRNC proposals that increase connectivity to Europe can take advantage of this concentration. Of course this raises the issue of the physical security of the network facilities. The concentration in New York City has been a fact of life for the carriers for a long time, and the carrier hotels are extensively interconnected. NYSERNet has deployed fiber throughout Manhattan, and in particular into other major carrier hotels, and uses that resource today to provide diversity and redundancy. All of those tools are available here for reliability. We applaud your capitalizing on the advantages of this concentration of both commercial carrier and research networks in New York City to make the proposed transport facility much more flexible and dynamic.

We look forward to the continuation of our longstanding successful partnership, and to working with you on your exciting DYNESTAR program to provide next-generation services and technologies, as well as vital support for research and education in many fields from high energy and nuclear physics, to astrophysics and fusion energy, to computational biology, oceanography, climatology, and nanotechnology. We are confident, given your past and present progress in many programs, that DYNESTAR will represent a major step forward in the history of research and education networks.

Sincerely,



Timothy Lance
President and Chair, NYSERNet
Distinguished Service Professor, University at Albany