PRESS RELEASE

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AmLight-ExP Networking Team demonstrates high-performance international connectivity at Supercomputing Conference (SC16)

Salt Lake City, Utah, November 15, 2016 - During the Super Computing 2016, network engineers from AmLight, Academic Network of São Paulo (ANSP), State University of São Paulo (UNESP), Florida LambdaRail and California Institute of Technology leveraged the AmLight-ExP network to demonstrate the new 200G capacity between South America and the U.S. A total of 176Gbps of aggregated traffic was measured between, São Paulo, Miami and Salt Lake City, Utah, where the Super Computing 2016 was hosted. The figure below shows a sustained flow rate of ~85Gbps, with peaks of 97Gbps, generated using the FDT software. For this demonstration, two high-end servers were installed in São Paulo (one at São Paulo Research and Analysis Center (SPRACE)/UNESP and one at ANSP) and one server was installed at AMPATH/NAP of the Americas, Miami, FL. At the SC16, Caltech provided a few 100G servers.

"We are now the only academic institution in Latin America capable of transferring data at 100 Gbps from/to the United States, through a DWDM infrastructure that includes two 100G channels from the UNESP Center for Scientific Computing to the headquarter of the Academic Network at São Paulo (ANSP), thus enabling us to improve the data transfer rate between our CMS Tier-2 and the remaining sites of the Worldwide LHC Computing Grid by one order of magnitude", said Sergio Novaes, PI of SPRACE and scientific director of UNESP Center for Scientific Computing.

In parallel with the high-performance network demonstration, Dr. Julio Ibarra, PI and Co-Founder of the Florida International University (FIU) Center for Internet Augmented Research and Assessment (CIARA), where these projects are based in the U.S., presented to the SC16 attendees the AmLight-ExP project titled "*Creating new opportunities for US and Latin America research and education collaboration through the development of an intercontinental 100G optical network infrastructure*". The AmLight Express and Protect (ExP) project implements a hybrid network strategy that combines optical spectrum (Express) and leased capacity (Protect) that builds a reliable, leading-edge diverse network infrastructure for research and education (NSF Award#ACI-1451018).
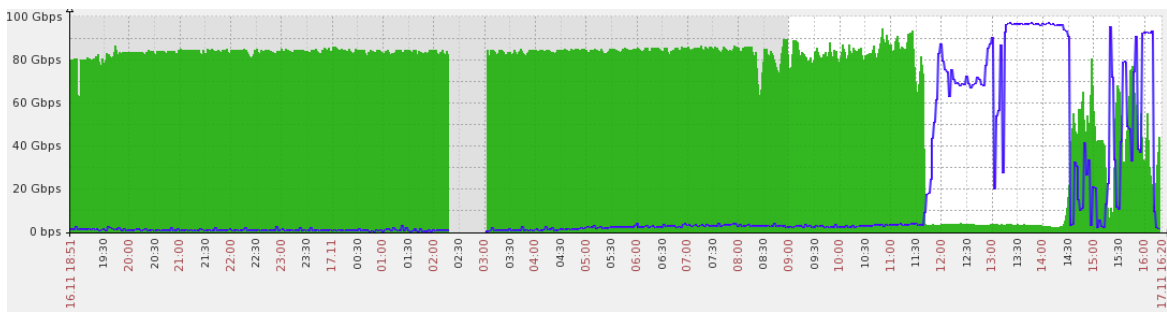
Figure 1 Demonstrated traffic in the Atlantic 100Gbps link

"Much recognition needs to go to the network engineers and the researchers who worked tirelessly before and during SC16 to configure and tune the network devices and servers to achieve these unprecedented results. I would like to congratulate our collaborators at UNESP, ANSP, Florida LambdaRail, and Caltech on this achievement, and the National Science Foundation for their support", said Dr. Julio Ibarra, PI of the AmLight-ExP project.

"We have only been able to achieve this unprecedented result due to the efforts of a remarkable team of system and network engineers and the support of partners such as ANSP, AMPATH, Caltech, and companies such as Huawei, Intel and Padtec among others. The partnerships aimed at generating innovative R&D projects that UNESP CSC has established with high-tech companies were essential to achieve this result. But we intend to go further: new experiments involving 100Gbps international channels and software-controlled network resources are already being planned", said Dr. Rogerio Iope, member of SPRACE engineering team and executive manager of UNSEP Center for Scientific Computing.

About AmLight ExP: AmLight Express and Protect (ExP) implements a hybrid network strategy that combines optical spectrum (Express) and leased capacity (Protect) that builds a reliable, leading-edge diverse network infrastructure for research and education. AmLight ExP operates high-performance network links connecting Latin America to the U.S., funded by the National Science Foundation (NSF award #ACI-1451018); With significant investments from the Academic Network of São Paulo (ANSP), and Rede Nacional de Ensino e Pesquisa (RNP) and the Association of Universities for Research in Astronomy (AURA), the total bandwidth provided by AmLight ExP between the U.S. and South America is expected to grow to more than 680 Gibabits per second in aggregate capacity between 2015 and 2020 (www.amlight.net).

About ANSP: The Academic Network of São Paulo (ANSP) provides connectivity to the top R&E institutions, facilities and researchers in the State of São Paulo, Brazil, including the University of São Paulo, the largest research university in South America. ANSP directly connects to AmLight in Miami at 20G. ANSP also provides connectivity to Kyatera, a 9-city dark-fiber-based optical network infrastructure linking 20 research institutions in the state and a number of special infrastructure projects like GridUNESP, one of the largest computational clusters in Latin America, supporting interdisciplinary grid-based science (www.ansp.br).

About Caltech: The mission of the California Institute of Technology (Caltech) is to expand human knowledge and benefit society through research integrated with education. We investigate the most challenging, fundamental problems in science and technology in a singularly collegial, interdisciplinary atmosphere, while educating outstanding students to become creative members of

society. The contributions of Caltech's faculty and alumni have earned national and international recognition, including 35 Nobel Prizes (www.caltech.edu).

About CIARA: Florida International University's Center for Internet Augmented Research and Assessment (CIARA), in the Division of IT, has developed an international, high-performance research connection point in Miami, Florida, called AMPATH (AMericasPATH; www.ampath.net). AMPATH extends participation to underrepresented groups in Latin America and the Caribbean, in science and engineering research and education through the use of high-performance network connections. AMPATH is home to the Americas Lightpaths (AmLight) high-performance network links connecting Latin America to the U.S., funded by the National Science Foundation (NSF), award #ACI-0963053 and the Academic Network of São Paulo (award #2003/13708-0) (www.ciara.fiu.edu)

About SC16: Each year the SCinet's Network Research Exhibition (NRE) showcases and number of interesting network-based experiments during SC. The goal of the NRE is to showcase technologies that will impact HPC in general and SCinet in particular. Topics for SC16's Network Research Exhibition demos and experiments range from software-defined networking (SDN) to security/encryption and resilience (www.sc16.supercomputing.org).

About SPRACE: The São Paulo Research and Analysis Center (SPRACE) is implemented with financial support from FAPESP, to provide the necessary means for the participation of high energy physics researchers from the State of São Paulo in these experiments. SPRACE congregates members of the DZero Collaboration at Fermilab and of the Compact Muon Solenoid (CMS) Collaboration at CERN. The SPRACE computing center provides more than ten Teraflops of computing power and it has been contributing for the processing, storage and analysis of the data produced by these experiments (www.sprace.org.br).

About UNESP: Universidade Estadual Paulista (UNESP) is one of the largest and most important Brazilian universities, with distinguished achievements in teaching, research and extension services. UNESP has consolidated a project joining scientific, technological, economic, cultural and social development committed to democratic principles and clearly conscious of its status of a governmental institution, inserted and highly active in Brazilian society. UNESP´s actions are focused in nearly every field of experimental and theoretical sciences such as: engineering, health, communications, humanities, social sciences and arts, among others (www.unesp.br).

About Florida LambdaRail: Florida LambdaRail (FLR) is Florida's Research and Education Network. With its 100 Gbps 1,540 mile dark fiber network, FLR provides a cost effective, ultra-high speed, inter-connected, broadband service delivery network that enables Florida's higher education institutions and partners to collaborate, connect, utilize and develop new innovative broadband applications and services in support of their scientific research, education, and 21st century economy initiatives (www.flrnet.org).