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Introducing new technologies, innovations, and collaborations in R&E Networking between Africa, Latin America, Europe and the US through new international projects

Geographically distributed science relies on Research and Education Networks (RENs) for data movement. End-to-end network paths for data movement in the transatlantic region rely on the collaboration of multiple REN operators (including TENET/SANReN, RNP, RedCLARA, GEANT and AmLight ExP).

Several RENs participate in the AmLight consortium to support the Americas-Africa Lightpaths Express and Protect (AmLight-ExP) project. The goal of AmLight-ExP is to operate and continuously improve production and experimental network connections between the US, South America, and Africa. Geographically distributed science in South America and Africa will dramatically evolve over the next five years, increasing dependency on advanced cyberinfrastructure and programmable networking.

AmLight leverages nearly two decades of accumulating consortium assets between the United States and Latin America and new long-term infrastructure to Africa, creating a critical cyberinfrastructure enabling research through sustainable and scalable connectivity. The consortium supports an evolving community-owned set of assets enabling AmLight-ExP to operate collaboratively, across North America, Latin America, Africa, and soon Europe. To increase network visibility and improve the services offered to the community, AmLight is deploying a new highly granular network telemetry solution that enables at scale per-packet monitoring. This solution will enable real-time troubleshooting and traffic engineering in a sub-second interval.

The ongoing expansion of RENs in Latin America and their new direct connection to those in Europe are the results of the ongoing Bella (Building Europe Link to Latin America) initiative, a consortium of Latin American and European RENs dating from 2016, with the objectives of improving the quality and capacity of connectivity within Latin America, and providing for the first time modern, large-scale direct connectivity between South America and European RENs, using the newly deployed EllaLink submarine cable between Portugal and Brazil. The Bella consortium has acquired spectrum on EllaLink, corresponding to 3/8 of the capacity of a fibre pair, for the expected lifetime of the cable (25 years). The consortium is also acquiring spectrum on terrestrial fiber within South America, some of which is provided by the Latin American member RENs, in order to capillarise access to the EllaLink cable, as well as to other international cables to Africa and to the US.

To improve the management and operation of all resources made available by the AmLight consortium members, including links and computing and storage resources, the AtlanticWave-SDX 2.0 project was created. The AtlanticWave-SDX 2.0 project aims to support research, experimental deployments, prototyping, and interoperability testing, at international scales. AtlanticWave SDX 2.0 goals include building a distributed intercontinental experimental SDX by leveraging Open Exchange Points (OXPs) connected to AmLight. The project also includes collaboration with the Open Science Grid (OSG) and Pegasus workflow management system.

A primary motivation for the development of the AtlanticWave-SDX 2.0 is facilitating the use of the international distributed REN network built for domain scientists and science applications for Distributed High Throughput Computing (dHTC), real-time high-availability applications (e.g., Vera Rubin Observatory, MeerKAT, SKA, HERA, PAPER), international research testbeds (e.g., FABRIC), and bulk data transfer applications (e.g., BigData Express).

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