BELLA IMPACT:
BELLA connectivity is bringing benefits to High Energy Physics research

In September 2021 we witnessed the official launch of BELLA, the new transcontinental link that interconnects the research network backbones in Europe (**GÉANT**) and Latin America (**RedCLARA**). The inauguration event took place online at TICAL, RedCLARA's annual conference.

(Testimonial by Mario Reale and Rosanna Norman, GÉANT) The unveiling was accompanied by live demonstrations on the use of BELLA connectivity and how it will benefit scientific research communities in both continents. In particular, one demonstration (see the video below) illustrated the use of the new 100G direct link between Fortaleza in Brazil and Sines in Portugal by High Energy Physics (HEP), undoubtedly one of the most demanding scientific communities in terms of network usage.

Through the fundamental contribution of RNP (Brazilian NREN), FCCN (Portuguese NREN), RedCLARA and GÉANT, and the direct involvement of the HEP research centres, SPRACE (São Paulo,

Brazil) and LIP (Lisbon, Portugal) in cooperation with the INCD computing infrastructure (Lisbon, Portugal), a sustained end-to-end data transfer at 100G was achieved, demonstrating how the new BELLA connectivity enables data transfer speeds 10 times higher than those allowed by the previous route that connected Europe and Latin America through North America.

In particular, the two tier 2 data centres of the Worldwide Large Hadron Collider Computing Grid (WLCG), SPRACE and LIP-INCD, were directly connected at 100G, and data sets of the CMS experiment at CERN were transferred from disk to disk from Portugal to Brazil, and vice versa, using GridFTP, a widely used file transfer protocol in HEP.

WLCG represents a distributed grid computing infrastructure with more than 170 sites around the world (in 40 countries), providing computing resources that total more than 300,000 cores and 500PB of distributed data storage, with more than 2 million computing jobs per day and is supported by the international links of research networks around the world.

The HEP demo allowed to verify the significant reduction of the Round Trip Time (RTT) between SPRACE and INCD, confirming a reduction of the RTT from 254 ms to 106 ms, passing from the old to the new transcontinental route (BELLA)."

The new BELLA intercontinental connection will allow us to look with confidence at the new evolution of LHC. The vast flow of data that we will need to transfer between Europe and Latin America will be supported by a high-capacity link that will enable us to manage the expected increase in computing and storage resources that High Luminosity LHC will require in the future – around 20 times the current values", says Sergio Novaes, Principal Investigator of the SPRACE project and high energy physicist at CMS.

"With the constant spirit of collaboration, resolution and speed, FCCN and GÉANT succeeded to upgrade the peering link between the Portuguese research network and the European backbone from 40G to 100G, and an upgrade of the link between INCD and FCCN in Lisbon thus enabling us to create the HEP BELLA demo showing the availability of greater capacity

for research networks around the world in the years to come", agree Jorge Gomes of LIP and Pedro Lorga of FCCN.

The 100G-supported data transfer was also made possible by the upgrade of the São Paulo State University data centre connectivity and by the steady, effective and efficient support provided by RedCLARA, RNP and the Research and Education Network at São Paulo (Rednesp).

Rogerio Iope of São Paulo State University (Unesp) closes: "Through the upgrade of the last-mile infrastructure between our data centre and the R&E network provider Rednesp, and thanks to the quickly established links with RNP and RedCLARA, we obtained a sustained throughput of data transfer of about 100Gbps between two pairs of high-end servers installed at SPRACE and LIP, which shows in fact an increase of a factor of about 10 compared to the throughput achieved before BELLA connectivity became operational".

Vea la demo en
https://youtu.be/ksZdQxHtxdI