From Geneva to Bologna in 9.5 milliseconds

For the first time, the Italian research and education network GARR and the pan-European network GÉANT have successfully **connected two data centres over 1000 km apart**: the national computing centre CNAF of the Italian National Institute for Nuclear Physics (INFN) in Bologna, and CERN in Geneva, with **a capacity of 1.6 Tbps** and a latency of just **9.5 milliseconds**, thanks **to multi-domain shared spectrum**.

The two data centres, in Italy and in Switzerland, can now seamlessly work together despite the distance and their different administrative domains. This solution provides a much faster connection with a larger and more scalable capacity at a fraction of the cost of upgrading a traditional packet connection. This milestone achievement uses the **sharing of the optical spectrum of fibre between GÉANT and GARR**, which is possible thanks to the innovative, partially disaggregated, optical network design of the two networks.

"With this multi-domain spectrum sharing, we have pushed the limits of currently available technology and gone beyond what was thought to be feasible to create something novel: a common model that is now replicable in other locations and by other organisations", GARR CTO, Massimo Carboni, comments.

This CERN-CNAF Data Centre Interconnection (**DCI**) was built as a pilot project of the new GÉANT spectrum sharing service. This pilot initiative came in response to CERN's challenge in processing the vast volume of data generated by the LHC experiments, which is expected to increase dramatically after the forthcoming **High Luminosity** upgrade for the LHC. As well as providing a much faster, and more scalable, connection between the two data centres for offline data processing, links such as this have the potential to enable data centres like CNAF to participate even more closely with the LHC experiments, not merely receiving data for later study but taking part in the high-speed, time-critical event selection that, until now, has been running at dedicated "trigger farms" located near the experiments themselves.

"This technology is disrupting not only because it provides a **cheaper solution to the extremely high throughput** required by LHC between CERN and each TIER1 for the next data-taking activity, but this "pure optical" direct connection, **opens up new ways for Data Centre Interconnection and Data Centre Stretching applications**", the Network Manager at INFN-CNAF, Stefano Zani, says.

This pilot is one of the many results of the GÉANT (GN4-3) project, co-funded by the European Commission and by the European National Research and Education Networks (NRENs), and specifically of an activity aimed at creating a **common model for spectrum-sharing interconnection** among different NRENs.

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GARR

GARR is the Italian national research and education network that provides advanced network services to the scientific and academic communities. GARR supports data-intensive research, innovation, and collaboration across a wide range of disciplines, facilitating access to global research networks and resources.

GARR network is designed and managed by Consortium GARR, a non-profit association founded under the auspices of the Ministry of Education, University and Research. The members are CNR, ENEA, INAF, INFN, INGV and CRUI Foundation, representing all Italian universities.

www.garr.it/en

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