GN3plus

Summary: Known simply as GÉANT, GN3plus is the extension to the third term of the successful GÉANT networking project that lies at the heart of the EU's e-Infrastructure strategy. Co-funded by the European Union (EU) and Europe's National Research and Education Networks (NRENs), GÉANT seeks to promote the free, unimpeded movement of scientific data and knowledge, by connecting and empowering research and education (R&E) communities within Europe and other world regions. By driving knowledge creation as the global hub for research networking excellence, GÉANT's vision is to become the unified European Communications Commons.

Objectives: The overall objectives of GN3plus are to:

- Deliver world-class networking services, at the highest levels of operational excellence, to research and education communities, building on GN3's success.

- Support the growth of R&E communities within Europe in both breadth and depth, and expose them to talent elsewhere, providing opportunities to meet across the divides of resources and distance and in so doing transform the way research is done.

- Innovate to meet the needs of the community, and act as a catalyst to translate this into a competitive European ICT sector.

- Research, collect and share knowledge about network technologies and services through cooperation and community collaboration.

Action plan: The GÉANT network has established itself as a vital part of the European e-Infrastructure, providing the reliable, high-speed, international R&E network and working in close partnership with Europe's NRENs and over 65 NRENs outside of Europe.
GN3plus will deliver fast and efficient provisioning of advanced services, develop operational support across management domains and enhance security to ensure service integrity and protection of network resources. These initiatives will be complemented by the development of application services in a federated environment such as mobile and wireless roaming, supported by Authentication and Authorisation Infrastructure (AAI) meta-service environments for individuals in the R&E community.

It will engage with large scientific institutions, projects and other collaborations to understand their needs, and by seeking synergies at European and national level with public service infrastructures when appropriate, particularly with respect to education. GN3plus aims to be a spearhead for technological innovation, developing new products and services through requirements-based R&D, with the Open Call and Public Private Partnerships potentially presenting new opportunities to work with industry and academia.

*Networking activities***:** The Networking Activities (NAs) will provide management and targeted outreach support for all GN3plus activities with the full extent of both internal and external communications, product marketing, international liaison and business development, as well as initiatives to nurture digital inclusion.

A particular emphasis will be to support and encourage the take-up of services among users, working closely with the NREN partners, and also to work cooperatively with other world regions to facilitate adoption of GÉANT services beyond Europe.

As a large and complex project, GN3plus has over 250 project participants across Europe. Streamlined collaboration and communication is essential, with a strong leadership and effective

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governance structure in place to ensure the continuing success of GÉANT. An essential aspect is to guarantee that the views of the users are represented. Thus the governance model includes representation from across the community with an International User Advisory Committee and the External Advisory Committee advising the Partners' Assembly (which deals with overall policy) and the Executive Board (which oversees its implementation).

*Service activities***:** The Service Activities will expand to include new areas of value to the Research and Education communities. GN3plus will continue the community building of the "GÉANT eco-system" by improving and innovating the portfolio of services as a whole, encompassing flexible connectivity options and test-bed facilities across the network. This will incorporate robust support and performance expertise; and advanced AAI, cloud and mobility services, to give end users, their projects and institutions secure access to the network with the resources they need, when and where they want it.

At the heart of the project is assuring the operation and enhancement of the 100Gbit/s backbone, to provide the highest levels of performance, reliability and security for even the most demanding users and the data intensive research projects of today

Joint Research activities The Joint Research Activities will focus on investigating new technologies and service trends expected to have an important influence on the future development of networking services required by the R&E community in Europe and worldwide. This will look at new network architectures adapted to mobility, cloud services and high-speed mobile networking; identity and trust technologies to improve collaboration across institutional borders and to support large-scale research initiatives whilst also guaranteeing the privacy and security of users.
Research will be conducted into potential paradigm shifts in service provisioning and management, giving the end users enhanced control over the network, the computing and data storage infrastructure and service stack. This work will include very active participation in global interworking/standardisation developments on Software Defined Networking (SDN), virtualisation, Network-as-a-Service (NaaS) and Networking Standards Interface (NSI) and will contribute to international initiatives, such as the International Network Development and Deployment Initiative (iNDDI) and OpenNaaS.

User communities: GÉANT offers world-class global connectivity and services across the GÉANT Service Area. The GÉANT network connects 38 NREN partners serving 43 countries, together reaching in excess of 50,000,000 end users from 10,000 universities, higher education institutes, research institutes, libraries, museums, national archives, hospitals, etc. and a further 27,000 primary and secondary schools.

With nearly all scientific disciplines now depending on ever-increasing volumes of data for their research (the "data deluge"), more sustained effort is needed to maintain and secure this position for the benefit of European society as a whole. Global scientific collaborations are created around new instruments (physics, astronomy, biology, etc.), generating huge amounts of data to be accessed and analysed, and using computing facilities that may be based in other locations. GN3plus will endeavour to support all users, and continue the work of GN3 in addressing the digital divide.

International aspects: Today's science, research and increasingly also education take place in global virtual environments. This requires GÉANT to offer to its connected communities not only extensive pan-European reach, but also global reach. GÉANT offers connectivity to 65 countries outside of Europe, reaching all continents through the TEIN (Asia Pacific and South Asia), EUMEDCONNECT (Mediterranean), RedCLARA (Latin America), CAREN (Central Asia), C@ribnet (Caribbean) and UbuntuNet (Southern and Eastern Africa) networks as well as the North American CANARIE, Internet2, ESnet, NISN and NLR networks.

These connections and collaborations make GÉANT the best-connected R&E network in the world and have positioned Europe as the global hub for Research and Education networking. The Project will continue efforts to secure this position for the benefit of European society as a whole.