THE GÉANT PROJECT (GN5-1 AND GN4-3N)
HIGHLIGHTS

This document presents the highlights of the EC-funded GN5-1 and GN4-3N projects from 1 January to 31 December 2023 (GN5-1 Period 1, GN4-3N Period 4). GN5-1 is the first phase implementing the actions defined in the 72-month GN5 Framework Partnership Agreement (GN5-FPA) established between the GÉANT Consortium and the European Commission in 2021. GN4-3N concludes the last of three phases implementing the actions defined in the 68-month GN4 FPA between the GÉANT Consortium and the EC that started with GN4-1 in May 2015.

The GÉANT projects are a fundamental element of the European Research Area. Through its integrated catalogue of connectivity, collaboration and identity services, GÉANT, together with its National Research and Education Network (NREN) partners, provides users with reliable, secure, unconstrained access to communication, computing, analysis, storage, applications and other resources, whenever and wherever needed.

GÉANT provides Europe's research and education (R&E) community with the connectivity and collaboration services needed to support evidence-based decision making and effective knowledge exchange with their peers around the world.

GN4-3N has delivered the most significant restructuring of the GÉANT backbone network in a decade, designed to support the needs of Europe's R&E community for the next 15+ years. In parallel, GN5-1 delivers excellence in networking and related services, extending its reach to strategically important and emerging areas such as high-performance computing, quantum key distribution (QKD) and time and frequency (T&F), evolving the Communication Commons towards data-driven research and education, supporting open science and strengthening Europe as a global research hub. The demands of the R&E community are evolving faster than ever in terms of quantity and types of data and diversity of disciplines, and GÉANT's flexible, agile and long-term approach remains vital to ensuring they are met.

160+ FTEs
600+ contributors
39 partners
43 countries

GN5-1
9 Work Packages
42 Tasks
36 Deliverables
45 Milestones

TNC23
715 event attendees
362 online participants
19 commercial partners

See highlights from past GÉANT projects →

Delivering tomorrow's network today

The GÉANT network continues to deliver world-leading connectivity services and extremely high performance for all users, while the largest infrastructure refresh in a generation has future-proofed European and international high-speed networking beyond the next decade, empowering research and education without constraints or boundaries.

Community-centric strategic planning: network evolution studies and workshops, the CTO workshop, and Network Infrastructure Advisory Committee (NIAC) meetings ensured community engagement and strategic alignment in defining the roadmap that sets out how the GÉANT infrastructure will evolve.

Next-generation network: 69 routes added to production service; 405 new Infinera nodes deployed; 50 legacy links decommissioned; 34 countries connected; total of 26,047 km of dark fibre or spectrum now lit. IP backbone links upgraded, reconfigured and added to support traffic growth.

Strong OLS foundation: rollout of Infinera FlexILS completed. The new Open Line System (OLS) provides a robust, flexible, state-of-the-art, long-term infrastructure that reduces dependency on the market, increases capabilities to introduce emerging technologies and services (e.g. the new GÉANT Spectrum Service, QKD and T&F distribution), is well placed to support big science users and HPC requirements, and that bridges the digital divide by extending the network to the edges of Europe.

Packet layer: procurement stage for the renewal of the packet layer concluded, with the contract awarded to Nomios/Nokia. The design for Phase 2 provider router functionality was completed and a migration strategy developed.

Effective network management: focused on management tools to support automation and multi-vendor environment. New GÉANT automation platform introduced and GÉANT Orchestration and Automation Team (GOAT) established. Improved reporting for capacity and performance monitoring implemented.

Service innovation: 3 services successfully passed the Product Lifecycle Management (PLM) Production Gate: GÉANT Managed Wavelength, GÉANT DTN Testing Facility and GÉANT Spectrum Service, enabled by the network refresh.

Enhanced security: significant progress in each of the key areas of people, process, tools and infrastructure to protect the network and users in a rapidly evolving threat landscape. Including establishment of a new Security Operations Centre, implementation of NeMo-based DDoS detection and mitigation solution, and integration of university research teams.
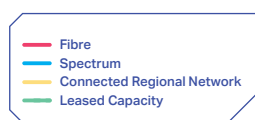
GN4-3N
26,047 km
OF DARK FIBRE AND SPECTRUM LIT

261
PHYSICAL SPANS

69
ROUTES FULLY DEPLOYED

€50.5M
TOTAL BUDGET

Fibre
Spectrum
Connected Regional Network
Leased Capacity

Meeting changing needs with service excellence

GÉANT's range of user-focused connectivity, collaboration, trust and identity, above-the-net and security services remains vitally important to research, education, and an evolving European e-infrastructure. An agile development approach ensures services continue to meet user needs in a rapidly changing environment, while the PLM framework ensures their quality and relevance.

Expanding above-the-net services: OCRE 2024 Framework procurement activities started; draft strategy for above-the-net services delivered; NREN cloud engagement database created; attendance at Cloud Forums increased; collaboration with global partners including I2, EUNIS and NII/SINET continued.

eduroam: record-breaking 7.5 billion national and international authentications in 2023 (20%+ growth); 5,100+ IdPs using CAT (8% growth); new geteduroam clients.

eduGAIN: 1 new federation joined, making a total of 79; 5,500+ IdPs participating (5%+ growth); operations team expanded; new governance model created; new operational architecture and automated deployment strategy underway; reporting tool enhanced; OpenID Federation proof of concept started.

Core AAI Platform: transformation from IAM solution to comprehensive platform solution completed; 21 deployments in total, including HPC community, EOSC and student mobility; exploratory work on advanced services underway.

InAcademia: 1 new identity federation became operational, bringing total to 10; 12 countries; 1,026 IdPs; 2.9M validations; rebranding completed; work towards innovative plugin for SME e-commerce platform underway.

eduMEET: spin-out to independent, community-financed open-source project underway; increasing NREN interest; used to connect and stream data from Yellowstone National Park's volcanic activity and transform it into a live musical performance, as featured on IMPACT website.

Network eAcademy: 8 new learning units published (5 OAV, 3 Quantum); 26 learning units in total; 2,700+ views from 484+ organisations in 66+ countries; new architecture and maturity model analyses completed.

Innovation: Above-the-Net, T&I and NetDev incubators continued to deliver innovative projects, with a total of 6 completed in P1 and 7 new projects identified.

Security services outreach: 2 crisis management workshops held; work to establish R&E Cyber Threat Intelligence Hub and security mentorship programme underway; Security Baseline Compatibility Matrix and Awareness Status Report published; awareness raised through successful Cyber Security Month campaign and 4 NIS2 infoshares.

Assuring quality and relevance: 3 services successfully passed the PLM Production Gate and 1 service passed the End of Life Gate. The PLM process underwent further evolution, ensuring that it continues to provide effective support to GÉANT products and services throughout their lifecycle.

eduGAIN
79 members
5,500+ institutions

IaaS+ Frameworks
469 contracts
950 institutions
28 countries

InAcademia
2.9M validations

eduMEET
Spin-out to independent community-financed project in progress

Core AAI Platform
Supporting European Research Infrastructures, HPC and Student Mobility

eduroam

7.5 BILLION NATIONAL AND INTERNATIONAL AUTHENTICATIONS

104 TERRITORIES
10,000+ INSTITUTIONS
38,400+ LOCATIONS

#love2eduroam
#love2eduroam
#love2eduroam

Strengthening the R&E community

By interconnecting Europe's NRENs and facilitating high-speed links with other regions across the globe, GÉANT connects schools, universities, and the world's largest research projects, enabling scientific discoveries, supporting remote learning, and upskilling communities.

Reaching end users: persona-targeted marketing for value-added end-user services developed, to improve effectiveness of marcomms activities.

Aligning with societal goals: the new Policy Engagement Task baselined the NRENs' awareness of and contribution to Sustainable Development Goals (SDGs) and digital rights and principles in preparation for defining best practices and recommendations.

Highlighting GÉANT's hidden presence: a new IMPACT section, "By Nature Invisible", created, featuring typical user personas and scenarios that show how the services provided by GÉANT and the NRENs work in the background to support scientists, researchers and students in Europe.

Strengthening relationships: 3 major face-to-face events held: the Project Management Convention, attended by 75 Work Package Leaders, Task Leaders, Coordinators and the Project Management Office; TNC23, with 715 attendees from 59 nations, 107 speakers, 362 unique online participants and 19 exhibiting commercial partners; and the Symposium, which attracted 260 project participants.

Nurturing growth: the Emerging NREN Programme drew 13 participants from Albania, Bosnia and Herzegovina, Ethiopia, Jordan, Malawi, Palestine, Peru, Serbia, Sri Lanka and Tunisia; the Future Talent Programme recruited and trained 17 students from 8 NRENs; and the T&I Mentoring Programme recruited 3 students from 2 NRENs. NREN Twinning Programme launched, pairing RENU (Uganda) with Sikt (Norway) and MAREN (Malawi) with ASNET-AM (Armenia).

Increasing visibility: the CONNECT website achieved its best results to date, its 124,200 visitors representing a 54% increase. In light of the changing social media landscape, GÉANT is shifting its focus towards rising platforms such as LinkedIn and Mastodon.

Promoting gender equality: GÉANT's Women in STEM campaign, run in parallel with Women's History Month, showcased the diversity, depth and breadth of female representation in the GÉANT community, encouraging girls and women who want to work in STEM subjects to pursue their goals.

Driving innovation: 10 GÉANT Innovation Programme projects completed, exploring innovative ideas in the areas of e-Health, Trust and Identity, Networking, and Security, with the overall aim of strengthening innovation in the community.

Sharing knowledge: 30 meetings took place within the GÉANT Community Programme, totalling 1,935 registered participants: 22 Task Force and Special Interest Group meetings, 3 "one-off" workshops and 5 collaborative project meetings.

Developing skills: 15 live training events were run for 216 attendees from 34 NRENs, and 18 new training modules were added to the eAcademy. Onboarding materials were fully refreshed at the start of GN5-1 to get new project contributors up to speed.

Shaping policy: the 2nd iteration of the CEO Track took place at TNC23 with 58 NREN and RREN directors, enabling focused discussions on topics of strategic importance at a global level. Regular coordination meetings held, on key areas including EOSC and EuroHPC.

Innovation Programme
YOUR_IDEA_HERE
10 projects completed

FUTURE TALENT PROGRAMME
17 students from 8 NRENs

COMMUNITY PROGRAMME
**30 meetings
1,935 participants**

EuroHPC
Joint Undertaking

Connectivity to all EuroHPC sites

eosc

CONNECT
**54% increase in visitors
400+ posts**