

# GÉANT

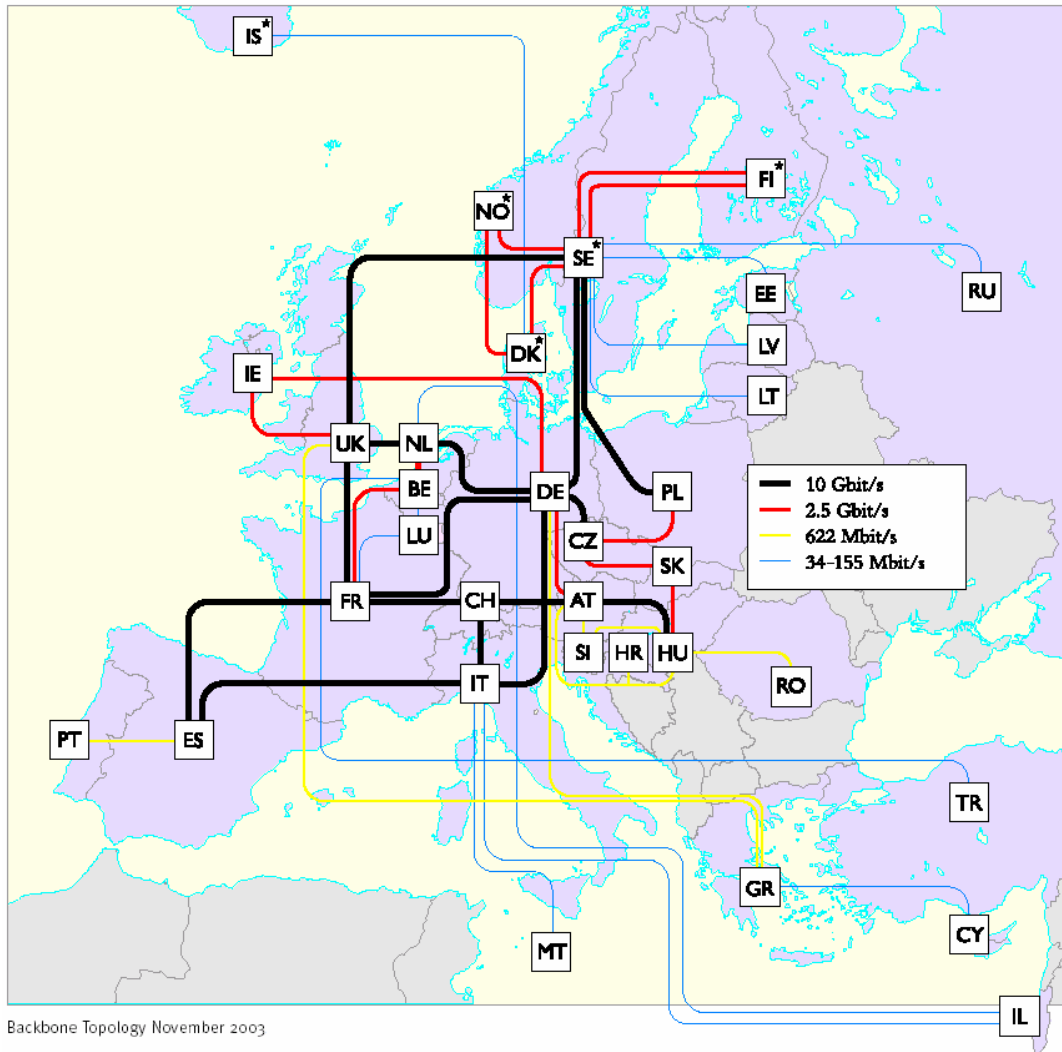
## GÉANT Network

### **Abstract:**

GÉANT is one of the most advanced Research and Education networks in the world today. It operates at the leading edge of networking and employs state-of-the-art technology and techniques to provide a networking service that interconnects the services offered by National Research and Education Networks (NRENs) across more than 33 European countries. Supporting the European academic and research community, GÉANT exploits developments in telecommunications and makes available previously unimagined transmission capacities for the scientific community.

### **Objectives:**

The primary objective of GÉANT is the creation of a Multi-Gigabit pan-European research network backbone interconnecting Europe's National Research and Education Networks (NRENs). Moreover, the intention to build upon the fundamental network platform since its inception has been a key goal driving the continued expansion of the network both in terms of the increase in its transmission speeds and its extension in geographic coverage in Europe (i.e. Balkans and Newly Independent States). Improving global connectivity has been a continuous effort and work is underway to establish additional connections to NRENs from other world regions. (Asia Pacific, Latin America, the Southern Mediterranean region and Southern Africa). Since the beginning GÉANT is developing the range of services available on the network like the deployment of IPv6 services. A number of other service developments have been initiated, to provide IP Quality of Service, IP Multicast and Virtual Private Networking. Network performance measurement tools and Network Security have also been the focus of significant development.



**Technical Approach:**

The technical approach is to procure advanced transmission and routing components via competitive tender and to integrate them to create an advanced network. Having done this, a programme of development is being carried out using the infrastructure.

Europe has an active presence in the development and testing of Internet technologies. This is particularly the case in the area of Quality of Service (QoS). It is also true for developments such as IPv6 and multicast. The management of services, across differing technologies and multiple management domains, is a serious challenge. In the global Internet community, much work is also in progress on the investigation and development of technologies to support QoS features in IP networks, multicast developments and trials of IP over DWDM. Bandwidth reservation and allocation, and the management of end-to-end QoS across different technologies and management domains are also key areas that have been the focus of considerable investigation.

**Testbed:**

Given the growing number, and the complexity, of the services being made available on GÉANT to NRENs, a multi-vendor test bed has been deployed, where new services like new routing protocols, Quality of Service, lambda networking or catering for specific communication needs of

IST Projects (e.g. 6NET, AQUILA, ATRIUM, MOICANE) can be tested and validated before they are made available on the production network.

#### **Innovation:**

The innovative elements of the project continue to be acquiring, integrating and deploying the most advanced transmission systems, routing equipment and services available to create a network which remains at the forefront of research networking developments. GÉANT is committed to providing European researchers with a world-class network.

#### **Results:**

As research becomes increasingly international, GEANT forms a core resource for an ever-expanding number of researchers whose demands on the network are constantly increasing, not only in terms of bandwidth requirements, but also for network services. These constantly expanding requirements demand that GÉANT remains committed to developing connectivity with equivalent Research Networks in other world regions. Connectivity has been strengthened with the existing equivalents of GÉANT in North America (Abilene, CANARIE, ESnet) and in Asia-Pacific (TEIN and SINET). There are currently five circuits to other world regions, four of which are to North America. Three operate at 2.5 Gbit/s and there is an additional 10 Gbit/s connection which is not funded by GÉANT but which supports one, 2.5 Gbit/s connection to Abilene and a further two, 1 Gbit/s connection to CANARIE. These four links dedicated to research and education purposes have been implemented in co-operation with North American research networks. A further 155 Mbit/s direct circuit to the Asia-Pacific region completes the picture in terms of GÉANT's global connectivity. Additionally there is 2.5 Gbit/s connectivity to Japan available via the GÉANT North American links. International connectivity in GÉANT is achieved through a European Distributed Access, which provides a number of access points for connection with other world regions.

#### **Success stories**

GÉANT has already created the most advanced international networking infrastructure in the world. It also provides and maintains a stable and dependable set of services on which a large and diverse end user community can rely. The service portfolio offered by the network has been expanded from a basic IP service to encompass a Quality of Service offering which currently consists of four services provided on GÉANT: Premium IP, Best Efforts, Less than Best Efforts and Multicast. In addition, IPv6 services have been fully implemented on GÉANT. This represents a major development in the services provided to Europe's research and education community.

GÉANT is the 6<sup>th</sup> generation of pan-European research network connecting European countries at backbone speeds of up to 10 Gbit/s. It continues to follow the trend established, that each successive generation of network exceeds the achievements and number of European countries involved compared with its predecessor. GÉANT continues to expand during its operational life, both in terms of the number of countries it connects and the capacity of its backbone and access links. In addition to connecting the existing 15 EU member states, GÉANT now provides services to the 10 Accession States due to join the EU in 2004, and to Croatia, Romania, Russia and Turkey. In total, the GÉANT backbone interconnects more than 3,500 research and education institutions in 33 countries through 29 national and regional research and education networks.

Project name:  
GÉANT

Contract no.:  
IST-2000-26417

Project type:  
RTD

Start date:  
1 November 2000

Duration:  
48 months

Total budget:  
€200,042,001

Funding from the EC:  
€80,000,000

Total effort in person-months:  
48

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RENATER  
RESTENA

RoEduNet  
SANET  
SURFNET  
SWITCH  
UKERNA  
UNICOM-B  
Univ. of MALTA  
Keywords:  
NRENs

Collaboration with other EC funded projects:  
CAESAR  
COMREN  
SERENATE

**IST - Research Networking - Networks for Research – European Research Network Backbone**