

# IPv6 Integration Case Study:

## Portuguese Academic Network

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## Abstract

The IPv6 has experienced a slow progress. However the inexistence of studies in this area does not aid in the understanding of its true evolution. Without the necessary measuring tools it is not possible to assess IPv6's dissemination levels and ultimately its success or failure. In this poster an initial study of the IPv6 integration in the Portuguese academic network is provided.



This study is part of a joining effort developed between the Fundação para a Computação Científica Nacional and the University of Coimbra to discover the current integration of IPv6 and its impact, at national level. The conclusions are encouraging since comparing the results from 2004 and 2005 it is possible to observe a significant increase in the traffic transmitted and received by the members of the Rede Ciência, Tecnologia e Sociedade.

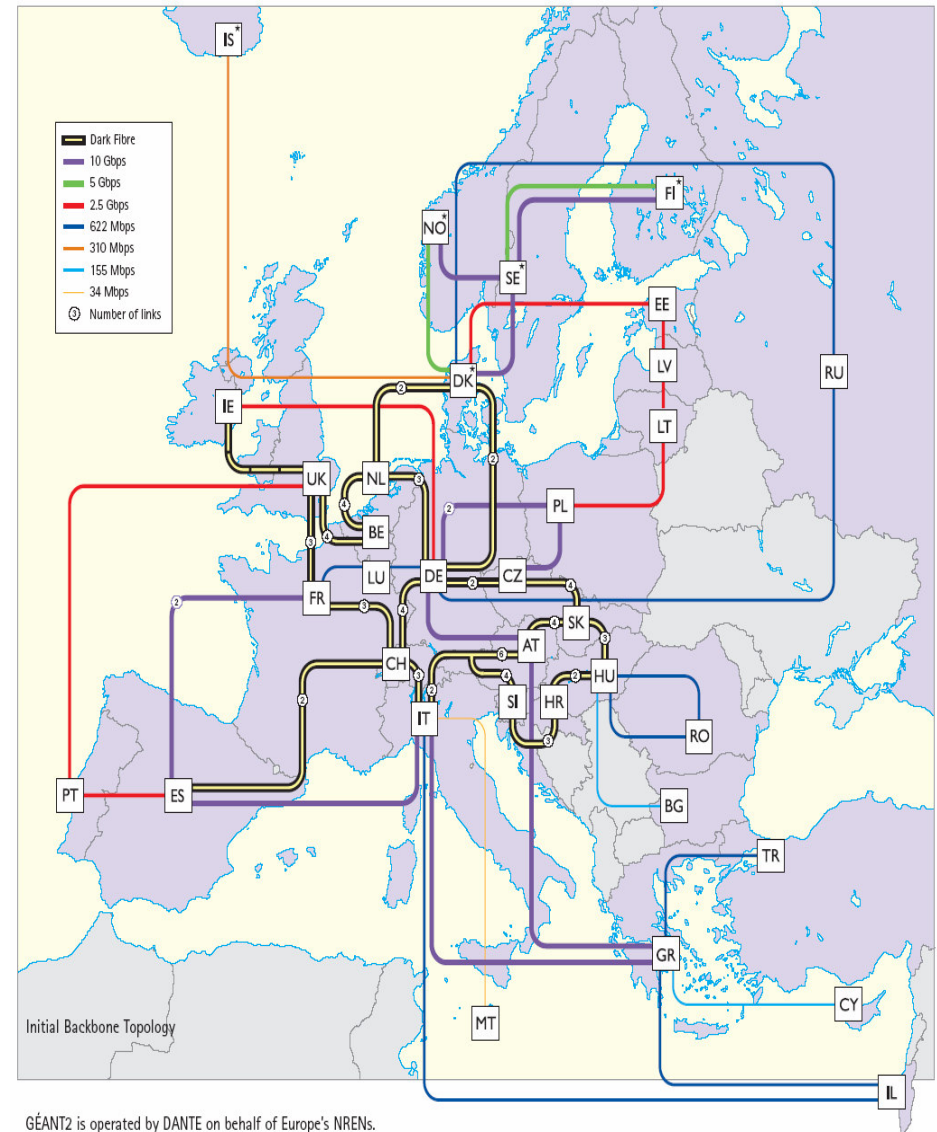


# GÉANT Network



## GÉANT

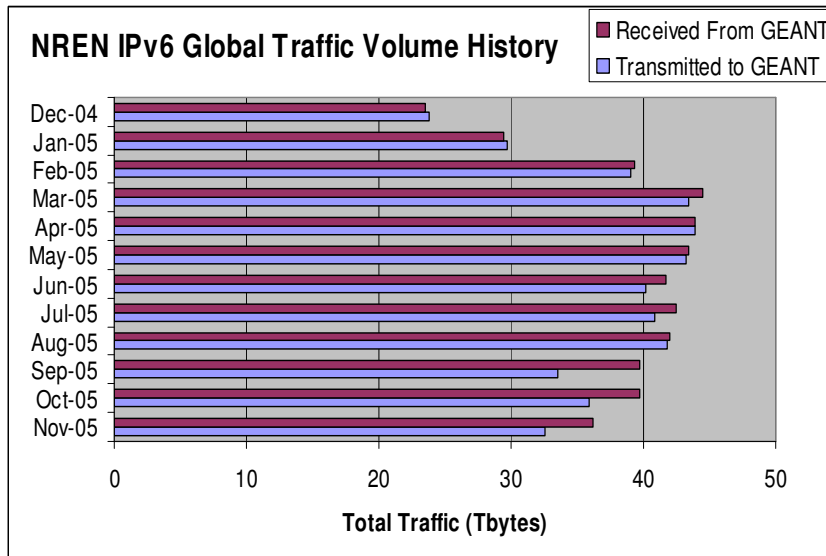
is a multi-gigabit data communications network designed specifically for research and education use. GEANT's transformation in a dual-stack infrastructure (April 2003) was the key push for the Portuguese academic network to go on the same path. Before the transition to GEANT2 (January 2006), almost all NRENs connected to the most advanced pan-continental network were using both IPv4 and IPv6. However, the trend even today inside any NREN's network is that only few universities and research labs are making a real use of IPv6 connectivity.



GEANT2 is operated by DANTE on behalf of Europe's NRENs.

# GÉANT IPv6 Traffic

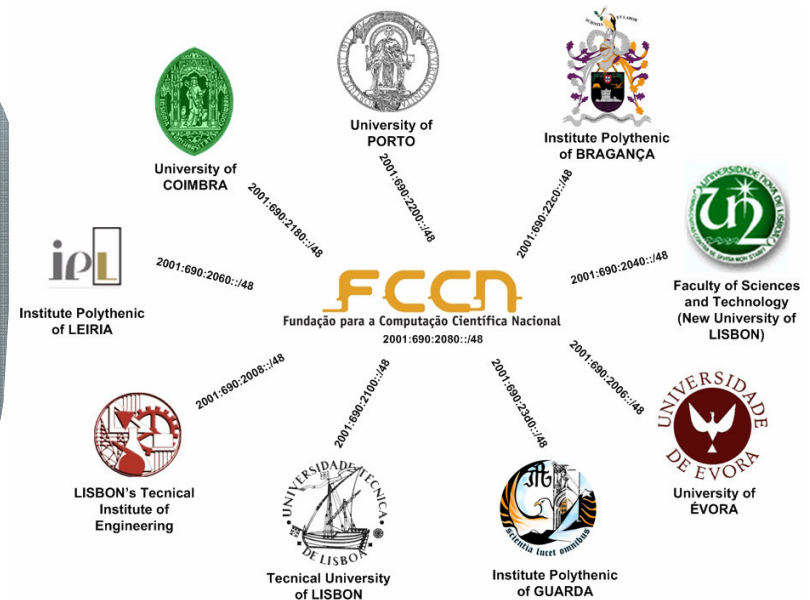
- The amount of traffic exchanged per year is 424.1 TBytes (transmitted) and 442.1 TBytes (received).
- FCCN represents less than 1% of the total traffic exchanged inside the GÉANT network.



	IPv6 Transmitted To GEANT (Gbytes)	IPv6 Transmitted From GEANT (Gbytes)
<b>NORDUnet</b>	2 518.25	13 048.27
<b>SWITCH</b>	10 045.05	10 894.74
<b>SURFNET</b>	13 830.06	7 568.09
<b>PSNC</b>	781.62	4 597.44
<b>BELNET</b>	10 048.05	2 087.55
<b>HEAnet</b>	800.76	400.37
<b>FCCN</b>	11.61	233.36
<b>RENATER</b>	85.23	103.94
<b>DFN</b>	182.84	69.94
<b>GRNET</b>	8.91	63.39
<b>EENET</b>	0.72	12.59
<b>REDIRIS</b>	135.75	4.84

# The IPv6 Portuguese Academic Network Integration

FCCN is the Portuguese NREN. It is a private entity that provides support to Portuguese universities, research institutions. FCCN is responsible to manage the Rede Ciência, Tecnologia e Sociedade (RCTS), which is a high performance network that provides a communication platform between academic, science and technology institutions.



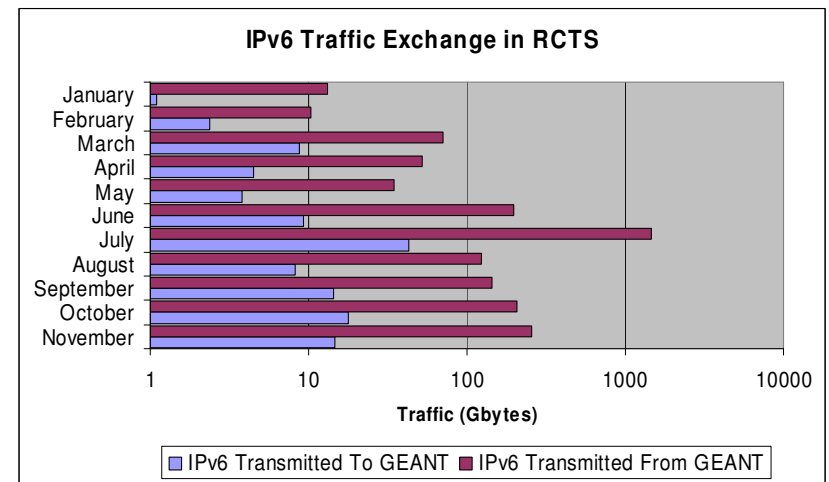
Since April 2003, FCCN is responsible to delegate IPv6 network prefixes to all of the RCTS members, and since then only 10 organizations requested native IPv6. In the starting year 5 organizations became IPv6 native, 3 in 2004, 1 in 2005 and 1 in 2006 (Table). Mainly to technical issues, such as unsupported IPv6 hardware, some of the organizations had to connect to the RCTS-IPv6 backbone through tunnel mechanisms.

	2003	2004	2005	2006
Native IPv6	5	3	1	1
Tunnel IPv6/IPv4	8	7	4	4

## The IPv6 Portuguese Academic Network Integration

The figure presents the evolution regarding the traffic from and to RCTS members in the year 2005.

The figure presents an abnormal value: in July the transmitted traffic achieved the 1456 GB, which represents an increase of 1300 GB when compared with the previous month. This can be explained by the use of some kind of traffic generator application, or the extensive use of heavy traffic applications such as FTP.



Comparing the values regarding the last quarter of 2005 and the same period of 2004, the increase of traffic was exponential, from 3.44 GB to 67.87 GB of transmitted traffic, and from 54.98 GB to 730.39 GB of received traffic.

## The IPv6 Portuguese Academic Network Integration

### Addressing Scheme

- 63 prefixes addressed to undergraduate schools, elementary schools and high schools. Each entity received a /56 network prefix;
- 102 prefixes addressed to Universities, Polytechnics and governmental organisms. Each institution received a /48 prefix;
- 1 prefix to be used by FCCN on its backbone, where the fundamental services are allocated, such as DNS, FTP, NTP, and news.

FCCN, as one of RIPE region's LIRs, has received a /32 IPv6 prefix upon request. From that addressing space, FCCN has already preemptively assigned each of the members of its network a /48 prefix, from the 2001:690:2000::/40 block.

From the total 65536 /48 prefixes only 166 were delegated, which represents about 0,25% of the available address space. From the 166 delegated prefixes only 10 are currently in use: 5 by Universities, 4 by Polytechnics and the other is used by FCCN on its backbone.

## Conclusions



The IPv6 integration is an issue that is not fully studied. Using the information produced by surveys and log files the authors tried, to answer questions such as: what is the percent integration of IPv6 compared to existing IPv4 networks; what are the main problems regarding the IPv6 integration; is the IPv6 traffic increasing when compared to IPv4 traffic. The results showed that there is an increase in the traffic exchanged, transmitted and received from the Portuguese academic network in the past two years. However, the number of IPv6-native organizations did not increase as expected. These two conclusions mean that the use of IPv6 is increasing but only where it is already supported, and it is not gaining the desired momentum, especially when compared to IPv4.