

GÉANT and the next-generation Internet IPv6



**the Multi-Gigabit pan-European
Research Network**

www.geant.net



The major success of the Internet has been its creation of a simple and ubiquitous data communications infrastructure for everybody, regardless of where they are in the world.

The Internet for data communications is equivalent to the telephone network for voice. Until the Internet emerged in the late 1980s, data communications either relied on proprietary standards, or on solutions organised on a national basis. It is fair to say that the original architects of the Internet were surprised by its run-away success.

One of the main challenges with any network is the number of users that can be connected. Most people will have experienced a change of telephone number several times in their life, either because they have moved house, or simply because the phone company has run out of numbers. The same issue applies to the Internet: it is simply running out of numbers, known in the data world as addresses. As the Internet becomes more and more fundamental to everyday data communications around the world, more addresses are needed with which to identify the devices which are connected to the Internet.

Internet Protocol version 6 (IPv6) is the solution to this



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problem. IPv6 makes available 2^{128} , or 3.4×10^{38} , possible addresses - sufficient to provide addresses to 6.5×10^{23} devices per square metre of the Earth's surface! This will revolutionise the provision of data services. It will allow devices as diverse as motor cars, central heating controllers and mobile phones to be built with their own IP address. These devices can then communicate and be communicated with over the net, enabling a range of new services to be offered. Interesting examples of the possibilities opened up by IPv6 are demonstrated by the WIDE project in Japan (www.wide.ad.jp) and include in-car

connectivity, Internet access without use of a keyboard or mouse (e.g. from fax machines or telephones), and use of the Internet as an information infrastructure following a disaster such as an earthquake.

As well as broadening the scope of the Internet, IPv6 will allow a number of more technical improvements, such as Plug and Play and Security.

IPv6 is playing a strategic role for the future of the Internet. Recognising this, the GÉANT network has begun providing IPv6 to the research networks it connects. Of course the existing IP service based on IPv4 will also continue to be used for a long time to come. Networks connected to GÉANT will be able to use either flavour of IP interchangeably, because the access to GÉANT will be implemented as a "dual stack" allowing both IPv4 and IPv6 to be used via the same network access.

GÉANT will be the pan-European backbone network providing IPv6 services to the Research and Education networks in Europe. It will act as a demonstrator and an enabler for IPv6 and will ensure that European Researchers are at the forefront of technological progress.



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