GÉANT IP Service Description

High Performance IP Services to Support Advanced Research

GÉANT IP

Overview

The GÉANT IP service provides high-bandwidth, international Internet connectivity for over 50 million users through GÉANT, the pan-European research and education network that interconnects Europe's National Research and Education Networks (NRENs).

The service has been designed to provide general-purpose, IP transit services between participating NRENs and other approved research and education partners and providers. Its core function is to provide a private service for IP traffic, separated from general-use Internet access.

Offering a neutral IP routing facility, without constraints imposed on access control, protocol or inter-domain routing, the award-winning network natively supports both IPv4 and IPv6 to offer NRENs maximum flexibility.

A wide range of connectivity up to 100Gbps per port and resiliency options to support NREN data connections across Europe is on offer.

With interconnectivity between GÉANT and all the major R&E networks, GÉANT IP breaks down geographical boundaries and supports advanced research worldwide.

The service available to members of the GÉANT community, and is co-funded by the NRENs and the European Union's Horizon 2020 Programme. Access is available to non - GÉANT NRENs only by special agreement.

Robust: Multiple connectivity options and diverse routing to maximise resilience.
High capacity: up to 100Gbps services are available.
Reliable: up to 99.999% availability.
Flexible: Flexible access speeds and neutral routing policies permit maximum control by the user organisation.

GÉANT IP Service Description

Technical Description of the Service
Infrastructure
The GÉANT IP service is delivered using the Juniper MX platform, built over a multi-terabit optical platform. The core backbone is built around 100Gbps trunks, which can be easily upgraded to several 100Gbps, when required.

The general IP design is resilient, typically the design means there is no single connection to any of the GÉANT PoPs. This resilience exists not only at the IP layer but also for the supporting transport infrastructure.

Access Description

The GÉANT IP service can be provided at capacities up to 100Gbps over a single interface. The capacity available to each NREN will depend on the capacity at the nearest GÉANT IP PoP or, if the GÉANT PoP is not co-located with suitable NREN access equipment, the available capacity of dedicated circuits from the NREN access equipment to the GÉANT IP PoP.

An NREN can connect to the GÉANT IP service in one of the three manners described below:

1. Diverse access over dark fibre: Where dark fibre is available in Location A and B, an NREN is connected to GÉANT in Location B through the Juniper MX for its primary connection. The backup connection is typically delivered through a Juniper MX in location A reached via the Infinera optical platform (DTN-X).

   This configuration is the most resilient setup, with service availability of 99.999%, and the capability to deliver capacity up to 100Gbps per port.
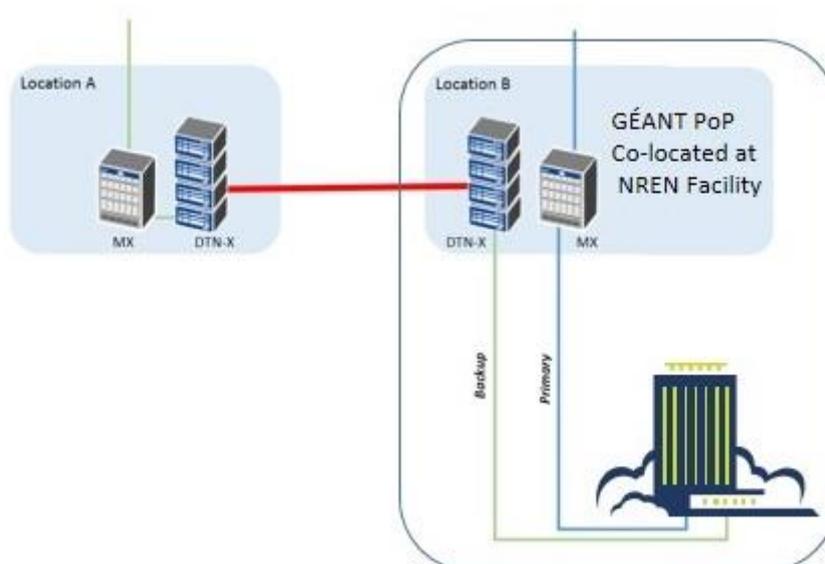
2. Multi-homed: An NREN is considered 'multi-homed' in either of the following two scenarios.

   First, the NREN is on the GÉANT dark fibre footprint but only connects (using two or more interfaces) to one GÉANT router.

   Second, where the GÉANT fibre footprint does not cover a specific country and the NREN is connected to the GÉANT backbone via one or more leased lines. These leased lines may be provided by a commercial supplier or an NREN ("cross border fibre"). If there is more than one leased line, connected to more than one GÉANT PoP, then the NREN is considered multi-homed. These diversely routed leased lines may connect directly to an NREN system, or they may connect to GÉANT Juniper routers (as shown in Figure 2**: NREN multi-homed**

   This configuration is a resilient setup, with 99.9% service availability and delivered capacity up to 100Gbps per port.
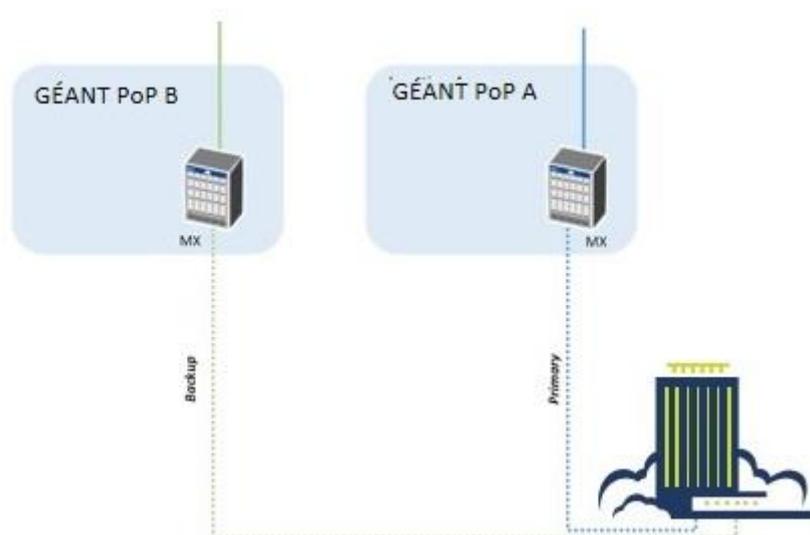

Figure 2: NREN multi-homed

3. Single homed NRENs: An NREN is considered single-homed if it has only one connection to the GÉANT network, be that a leased line to a remote GÉANT PoP, or short cable to a co-located GÉANT router or DTN-X system. As such, availability figures will depend on the exact setup and (in the case of a leased line) the selected provider with a minimum of 99.4%. Capacity up to 100Gbps per port is available on GÉANT equipment.
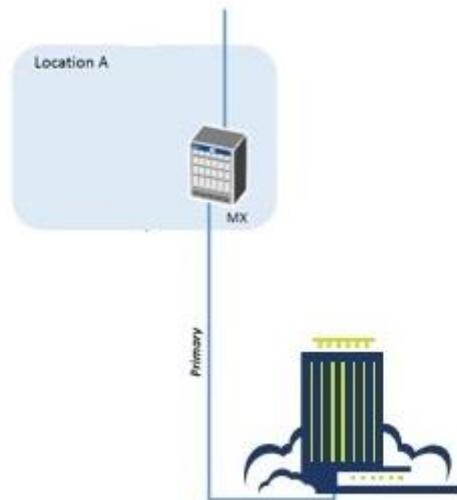
Figure 3: Example of a single-homed NREN

Load Sharing

When an NREN connects to more than one PoP, it may request that the traffic load be shared across its multiple access circuits, as seen below in Figure 4.
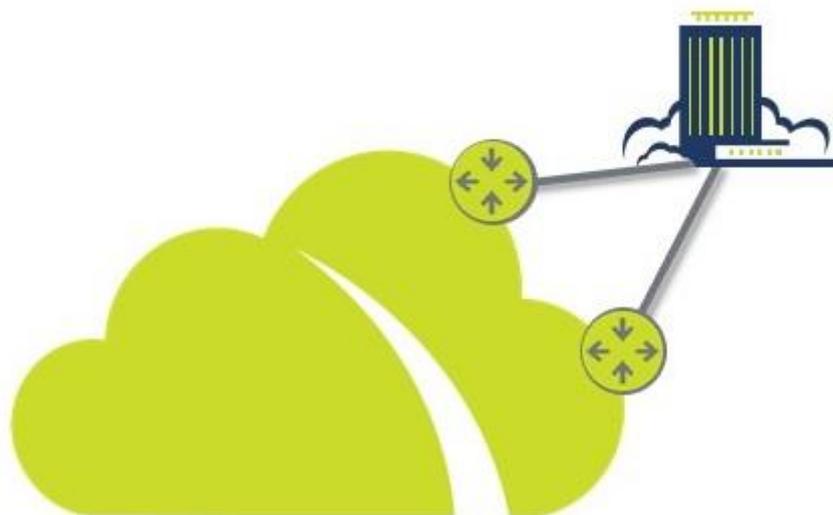

Figure 4: Example of load sharing on multiple PoPs

Load sharing is achieved by giving all of that NREN's IP access points the same Border Gateway Protocol (BGP) Local Preference value. By default GÉANT traffic destined for the NREN will be routed to the NREN's nearest access point, however the NREN may use the BGP Multi-Exit Discriminator (MED) attribute in order to dictate which of its subnets are reached by which gateway.

When load sharing is enabled, the total volume of traffic across all the active accesses must remain within the NREN-subscribed IP capacity. It is the NREN's responsibility to ensure their subscribed capacity is not exceed, and to load share their access points in accordance with their preference using the techniques described in the paragraph above.

Routing Information

To ensure the integrity of the NREN routes announced by GÉANT, lists of valid prefixes for each NREN are compiled on a daily basis, and GÉANT will only accept a prefix advertised by an NREN if it matches their list. The prefix lists are derived from the RIPE object(s) maintained by the NRENs to ensure the latest information is used. It is the NRENs responsibility to ensure the RIPE information is kept up to date.

More information regarding the GÉANT routing policies can also be found here:
https://partner.geant.net/sites/Partner/SitePages/Operational%20documents.aspx

Security

As an IP transit service, GÉANT IP provides security by monitoring the network for suspicious behavior and the GEANT CERT is the Computer Emergency Response Team (CERT) makes sure that an appropriate response is given to possible threats. The team will inform NRENs if any security incident affecting them is detected. NRENs are also able to subscribe to the Network Security Handling and Response Process (NSHaRP), without incurring any additional cost.

By subscribing to the NSHaRP service, the NRENs will be able to choose which events they wish to be informed of and will start receiving automated emails notifying them of any such anomalies detected. More information on NSHaRP is available at: http://www.geant.net/Network/NetworkOperations/Pages/NSHaRP.aspx

Demarcation Points
The management demarcation point between GÉANT and the NREN network is a port on the Optical Distribution Frame (ODF) rack, as described in Figure 5, below. The exact port will be specified at the time of the connection.
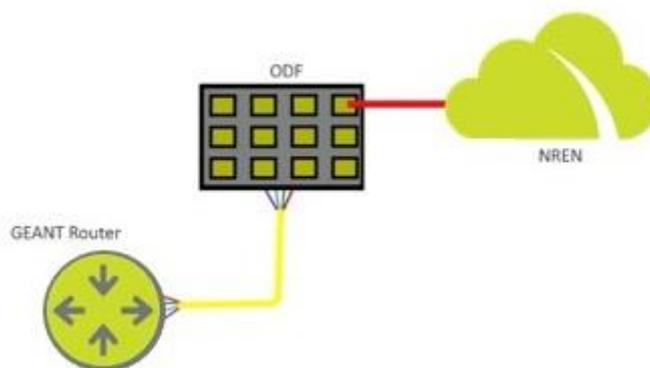
Figure 5: Illustration of the management demarcation point

The responsibility of the GÉANT Operations Centre (OC) ends at the declared demarcation point. Patching up to this point is the responsibility of the ordering NREN.

Configuration Details

The following configuration details will be provided by GÉANT:

- IP addresses for the NREN access router and the GÉANT BGP peer.
- Autonomous System (AS) number of the GÉANT network.
- Message Digest Algorithm 5 (MD5) password for the BGP session (if required by the NREN).
- MSDP peer address (if multicast is being supported).
- The Maximum Transmission Unit (MTU) size to be configured on the interfaces.
- Any other interface-specific configuration.

The NREN must specify:
- AS number of the NREN.
- RIPE DB as-set or autnum which defines the prefixes to be accepted by GÉANT.
- Whether or not an MD5 password is required for the BGP peering
- MSDP peer address (if Multicast is being supported).

Service-Level Target

Availability Target

The Service Level Target (SLT) for availability is calculated at the GÉANT demarcation point and excludes Planned Maintenance and any outages related to NREN equipment or activity. The service is considered unavailable when the NREN is unable to send or receive traffic over any of its GÉANT access circuits i.e. all access connections are concurrently unusable.

For full details of the Service Level Targets for GÉANT IP service please refer to the Service Level Target documentation on the GÉANT Partner Portal.

NRENs can view traffic statistics that are either specific to the service, or for overall IP traffic on NREN access links. These statistics are accessible via the GÉANT Tools Portal: https://tools.geant.net/portal/

Time to Fix a Fault and Time to Respond Target

In order to meet these targets, the following times to respond to and fix a fault have been

For full details of the Service Level Targets for GÉANT IP service please refer to the Service Level Target documentation on the GÉANT Partner Portal.

The GÉANT Operations Centre (OC) provides 24×7 support throughout the year. Notifications are issued to the affected partner within 15 minutes of incident detection by the central monitoring system.

Request procedure, service implementation and delivery time

Requesting additional GÉANT Access Capacity
To request an IP upgrade, please go to the GÉANT Partner Portal at:
https://partner.geant.net/sites/Partner/SitePages/Service%20Request.aspx

Service Implementation and Delivery Time

Service implementation will depend on available capacity at the connection PoP.

Managed Wavelength Upgrades
In case of a connection being provided over a managed wavelength, the lead time will vary from provider to provider. Delivery times will be confirmed on a case-by-case basis. Please contact the Partner Relations team for more information: partner-relations@geant.org.

For full details of the Service Level Targets for GÉANT IP service please refer to the Service Level Target documentation on the GÉANT Partner Portal.

Interface Options

Access of 40Gbps or below will be delivered on N x 10Gbps interfaces and services of 50Gbps and over will be delivered over a 100Gbps interface.

A total capacity upgrade of 40Gbps is offered over multiple 10Gbps interfaces by default, with the option of a 100Gbps interface instead of extra cost.
The table below details what interfaces are included in service upgrades. Port prices for the upgrade options can be found in the service price list at:
https://partner.geant.net/sites/Partner/SitePages/Service%20catalogue.aspx

Current Bandwidth (Gbps)	Upgraded Bandwidth	Default upgrade option No additional cost to the upgraded access	Alternative upgrade option Additional cost to the upgraded access
10	Up to and including 50G	Up to 4 additional 10G ports	1 x 100G
20	Up to and including 50G	Up to 3 additional 10G ports	1 x 100G
30	Up to and including 50G	Up to 2 additional 10G ports	1 x 100G
40	Up to and including 50G	1 additional 10G ports	1 x 100G
50	Up to and including 100G	1 x 100G ports	n/a
60	Up to and including 100G	1 x 100G ports	n/a
70	Up to and including 100G	1 x 100G ports	n/a
80	Up to and including 100G	1 x 100G ports	n/a
90	Up to and including 100G		

Pricing

GÉANT IP access is inclusive of all the required interfaces on the GÉANT IP equipment (unless a non-standard delivery option is required). An annual cost for the service is calculated annually by the GÉANT Cost Sharing Model. For the current version of the Cost Sharing Model, please see the Partner Portal
https://partner.geant.net/sites/Partner/SitePages/CSM.aspx

The GÉANT IP Service provides NREN access to the GÉANT IP Service, as well as to other GÉANT services, such as GÉANT Plus and GÉANT L3VPN. See
https://partner.geant.net/sites/Partner/SitePages/Service%20catalogue.aspx for more information on these services.

One-off charges apply to backhaul a backup circuit to a neighbouring PoP to increase the resilience *required to reach 99.999% service availability.*

For more information or questions, please email partner-relations@geant.org.

GÉANT IP Summary Table

AS Number	• 20965
RIPE Object	• AS-GEANT
Supported Client Interfaces	• 10GE • 100GE
Optical Connectors	• 1000BASE-LX, 1310nm (SMF) • 10GBASE-LR, 1310nm (LAN-PHY) • 10GBASE-LR, 1310nm (WAN-PHY) • 10GBASE-ER, 1550nm (LAN-PHY) • 10GBASE-ER, 1550nm (WAN-PHY) • 100GBASE-LR4 (LAN-PHY)
Protection	• Available
Guaranteed Latency	• No
Operations Centre Coverage	• 24/7/365