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## Deliverable DN3.0.3,3: Specific Support Actions: Addressing the Needs of the Network's Most Demanding Users



### Deliverable DN3.0.3,3

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### Abstract

This Deliverable describes the various support services that are in place to assist network users. This is the third update of this document.

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## 0 Executive Summary

This document describes the GÉANT2 User Support services. It details the improvements that have been made to user support, and describes in detail what the services entail.

User support is a vital component of any service. But it is particularly important for GÉANT2 as a number of users have high demands of the network service, requiring large amounts of data to be transmitted without issue. A particular example (described in this document) is the Large Hadron Collider (LHC) project at CERN (the European Organisation for Nuclear Research), which is predicted to produce 15 Petabytes (15 million Gigabytes) per annum that has to be communicated to the partner organisations.

This document describes the user support developed for these demanding GÉANT2 users. The support improves upon previously existing services. These improvements are:

- On-Line Request of Point-to-Point Services.
- Performance Measurement and Monitoring.
- Performance Enhancement and Response Team (PERT).

The Action Plan for developing such user support is described here, and examples are given (in particular for PERT).

The support offered to specific user groups is also described in detail (for LHC-OPN, DEISA, eVLBI, Phosphorous and EGEE) as is the process for requesting point-to-point services.

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# 1 Introduction

User support for any service is a vital component of that service.

This document describes the user support developed for GÉANT2 users, improving upon previously existing services. These improvements are:

- On-Line Request of Point-to-Point Services: This improves upon the static request system in place previously.
- Performance Measurement and Monitoring: The perfSONAR infrastructure provides a multi-domain monitoring (MDM) service that answers the need for cross-domain monitoring capability.
- Performance Enhancement and Response Team (PERT): PERT provides an investigation and consulting service for troubleshooting or advising on network performance issues

Part of the action plan for user support development that generated the above improvements covered specific support services for user groups identified as having particularly demanding network requirements. This means groups that have unusually high data transmission requirements, and/or demand high-speed of transmission and guaranteed access to these high-speed routes.

The groups discussed in this document are:

- LHC-OPN at CERN: CERN is the world's largest organisation for research into particle physics. The LHC project is the largest scientific project in the world, such that no one organisation or nation can handle the huge amounts of data (predicted at 15 Petabytes per annum).
- DEISA: DEISA is a consortium of leading national supercomputing centres in Europe. It aims to build and operate a distributed terascale supercomputing facility. Reliability is an absolute requirement for such a project.
- eVLBI: The European VLBI Network (EVN) is the collaboration of major radio astronomical institutes in Europe that works together on the data collected by an array of European radio telescopes. The EVN also works with similar institutes in Asia and South Africa. eVLBI demands rapid response to events, such as telescope outages and astronomical events, so high transmission speeds and reliability are of paramount importance.
- Phosphorus: The Phosphorus project is the creation of a network testbed using a number of GÉANT2 point-to-point connections. This will be used to develop and test software tools for end-to-end, on

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demand provisioning of network services, and to facilitate the integration of data storage and other resources in a multi-domain environment.

- EGEE: The EGEE Network Operations Centre (ENOC) needs to make Premium IP reservations that span multiple domains (which is to say, those networks such as GÉANT2 that support multi-domain Premium IP). This not only demands speed of service, but the ability to provision and monitor across multiple domains.

A particular support request was for the development of an on-line point-to-point booking service. This is described in Appendix A.

## 2 Improvements to the GÉANT2 User Support Service

### 2.1 On-Line Request of Point-to-Point Services

In 2006 a service request form was developed for point-to-point circuits. This form was a static Excel spreadsheet, and was published on the GÉANT2 intranet. It operated successfully for more than 12 months, but potential improvements to the request process were noted:

- The form was static and thus had no version control by DANTE user support (the latest versions were not always used by NRENs who had downloaded the form previously).
- The form could be submitted incomplete or incorrectly completed, representing a cause of considerable work for DANTE staff.
- The completed form was not accessible on-line for all involved.
- There was no automatic mechanism to ensure that both NRENs were agreed on the shared implementation of the circuit.
- There was no shared method to track the progress of the order, for DANTE internal purposes and for the NRENs requesting the service.

Using these comments as a starting point, several meetings were held with a cross-section of DANTE staff to establish the full set of requirements of this form. Requirements were captured and assessed, with the aim of achieving maximum value from the form and associated process. Based on this analysis, a new form was developed. After significant internal testing the new form was delivered through the DANTE website in August 2007.

The immediate advantages of the new form over the Excel form are:

- Drop-down menus of options.
- Help functionality.
- Automated email responses.
- Ability to track progress of request and retrieval of request data.

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It is intended that the back-end functionality of the form can be expanded to automatically complete operational and administrative databases.

The on-line form has now been used to request eight point-to-point circuits, and although useful feedback on specific detail has been received, the overall approach has proven sound.

See Appendices B and C for a copy of the form and the associated help procedure.

## 2.2 Performance Measurement and Monitoring

The perfSONAR infrastructure provides a multi-domain monitoring (MDM) service that answers the need for cross-domain monitoring capability.

The perfSONAR MDM service enables users to:

- Access network metrics for their own, or any other, network in the European REN. The metrics have a universally consistent meaning within the entire European REN.
- Perform network measurements in different networks.

The MDM has been rolled out to six networks (FCCN, GARR, GÉANT2, NIIF, PIONIER and SWITCH), and has been supported by a dedicated Service Desk at DANTE. The Service Desk provides support for the monitoring software, operating system, and hardware.

This implementation specifically targets Network Operating Centre (NOC) and Performance Enhancement and Response Team (PERT, see below) users, with the PerfsonarUI user interface being specifically designed so that they can access the monitoring capabilities efficiently.

The main objectives are to enable the NOC and PERT users to identify where performance degradations occur quickly, and to provide a multi-domain view of network performance to the network operators.

The six networks in this implementation provide information about historical information on IP link utilisation, IP link capacity, one-way delay, one-way packet loss, IP packet delay variation, traceroute and TCP throughput. Also they provide the capability of triggering on-demand TCP throughput tests and “show commands” on routers.

The next phase for the MDM service is a Prototype phase, where twelve networks will be providing network monitoring information. The MDM service will also be offered to other Demanding Users, such as LHC.

## 2.3 Performance Enhancement and Response Team (PERT)

The Performance Enhancement and Response Team provides an investigation and consulting service to any academic or research user for troubleshooting or advising on network performance issues.

In the last six months the PERT has formally investigated two cases for demanding users:

- In July 2007, ESA reported slower than expected data transfer rates between its satellite ground station in Maspalomas (Las Palmas, Canary Islands), and other ESA sites. For example, from Maspalomas to ESRIN (nr Rome, Italy) only 3.8Mbps could be achieved. SWITCH determined that the Maspalomas host had undersized buffers and recommended they be increased. After this, speeds of up to nearly 20Mbps (the subscribed access speed) were achieved between Maspalomas and the RedIRIS iperf server in Madrid.
- Also in July 2007, DANTE PERT was requested to investigate throughput limitations between JIVE (NL) and Shanghai Observatory (SHAO), over the path GEANT2-ORIENT-TEIN2-CERNET-CSTNET. A data throughput test run between GEANT2 PoP in Copenhagen and the TEIN2 PoP in Hong Kong achieved a respectable 418Mbps where the bottleneck capacity was 622Mbps. Radio Astronomy (eVLBI) data is very tolerant to random packet loss, but not very tolerant to delayed data, and so the solution to the issue of sub-optimal throughput was to use the UDP protocol for the data transfer, instead of TCP. In fact there was nothing new about this case that lead to this conclusion, but rather it had just been taking time to enhance the proprietary eVLBI application for use with UDP. Fortunately this upgrade was ready in time for the important Xi'AN APAN Meeting, where delegates saw eVLBI in action and, and the Shanghai telescope was able to successfully send data at a rate of 256Mbps to Europe.

## 2.4 Specific Support Actions for GÉANT2 User Groups

As listed in the above sections, a distinct action plan has now been developed for the establishment of a formalised user support service within GÉANT2. Specifically the action points are as follows:

- Establishment of an on-line web-form for ordering of GÉANT2 point-to-point services –**Completed:** July 2007
- perfSONAR Multi-Domain-Monitoring (MDM) Managed Service rolled out to six European countries as demonstrator –**Ongoing -Status:** Hardware, 96% complete as of 12 March 2008; Software, 83% complete on 22 February 2008
- Service desk established at DANTE to support perfSONAR MDM –**Completed;** May 2007
- PERT team to establish a federalised structure, with local PERT teams in participating NRENs –**Due:** September 2008
- The establishment of a network of user-support contacts from the European NRENs and beyond began in Q4 '06. This will clearly be an ongoing task, and steps to facilitate the interworking of the user support, PERT and operational functions of research networking organisations will continue over time. **Ongoing.**
- Publication of a definitive GÉANT2 service portfolio, accurately describing the services available to users of the network –**Due May 2008**

## 3 Support Offered to Specific User Groups

### 3.1 LHC-OPN

#### 3.1.1 Background

CERN is the world's largest organisation for research into particle physics. Based in Switzerland and funded by 20 European member states, CERN is a world-wide enterprise involving scientists of many nationalities. It is a shining example of international collaboration, as many experiments conducted at CERN are such that no single state could afford to fund them.

CERN's most ambitious project to date, the Large Hadron Collider (LHC), is currently under construction. LHC will collide fundamental particles together at unprecedented energies, producing short-lived and never-before-seen results. It is said to be the largest scientific endeavour in history, predicted to produce data at the rate of 15 Petabytes (15 million Gigabytes) per annum. It would be undesirable to process all this data at any one institution, so the results will be distributed by GÉANT2 and the connected NRENs to analysis sites around the globe.

To plan for this data distribution, the LHC Computing Grid (LCG) memorandum of understanding ([http://lcg.web.cern.ch/lcg/C-RRB/MoU/WLCGMoU\\_August2.pdf](http://lcg.web.cern.ch/lcg/C-RRB/MoU/WLCGMoU_August2.pdf)) defines the Tier-0 and eleven Tier-1 sites along with their functions and duties in providing the infrastructure for LHC data analysis. The LCG has established wavelength class (10 Gb/s) links connecting each Tier-1 site to the central Tier-0 site at CERN, with decisions on networking undertaken individually by the Tier-1s, coordinated by a consensus process.

The GÉANT2 partners have helped compile the principal architecture document for the Optical Private Network (OPN) created by these links, which can be found at:

<https://twiki.cern.ch/twiki/bin/view/LHCOPN/LHCopnArchitecture>

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### 3.1.2 User Support Provided

Support for the LHC project has been provided by the GÉANT2 NRENs (seven of which host Tier-1 sites) and DANTE (which has facilitated international connectivity). This support has taken the form of consultancy for the design of the Optical Private Network (OPN) and through the organisation of, and attendance at, regular meetings, taking place approximately three times per year from 2005 onwards. In particular, work by DANTE engineering staff has concentrated upon assessment of the shared risks presented by multiple OPN circuits (provided by GÉANT2 and other networks) using common ducting (and even common fibre) at certain points across Europe. Suggestions were submitted to the LHC-OPN working group as to ways in which the robustness of the network could be increased. This analysis led directly to the rerouting of one of the Amsterdam-Geneva 10Gbps wavelengths via London.

#### 3.1.2.1 Operational Procedures

The LHC-OPN has been constructed as a set of layer-1 wavelengths, the operation of which will be supported by a GÉANT2 function, the End-to-End Coordination Unit (E2ECU), acting as a coordinator between the NOCs of the relevant domains. The higher network layers upon which the actual LHC data will be carried have also recently become a focus for the LHC-OPN operations working group. Consultation is ongoing as to the optimal way to operate the layer-3 IP network over the 10Gbps OPN provided by the GÉANT2 partners and others. An equivalent function to the E2ECU, the LHCOPN IP Coordination Unit (LIPCU), has been proposed by GÉANT2 to take responsibility for the coordination of layer 3 operations.

#### 3.1.2.2 Monitoring

Because of the mission-critical role of the network in LHC data analysis, any problems or blockages in the network have to be found quickly and corrected. Therefore, monitoring of the OPN is an important area of work for the GÉANT2 consortium.

When monitoring an OPN that has been stitched together from many network domains and contains many active management elements, the monitoring system has to reflect that structure. The perfSONAR toolset (developed jointly by GÉANT2 and the American networks, Internet2 and ESNET) is specifically designed to facilitate such monitoring over multiple network domains. Special versions of the perfSONAR monitoring tools have been implemented to examine layer 1, 2 and 3 operations on the OPN. The e2eMON tool is used to monitor layer 1 and 2 operations whilst the perfSONAR MDM service has been implemented to monitor the IP overlay service. These tools facilitate the effective operation of the OPN by the LIPCU, the E2ECU and the Tier-1 sites contributing to LHCOPN operations.

The measurements offered by perfSONAR are both active and passive in nature. Active measurements include one way delay and jitter, achievable throughput, round trip-time and routing information. Passive measurements provide utilisation statistics, evidence of input errors and packet discards.

Further information on the monitoring tools for LHCOPN can be found in:

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- GN2-07-308 perfSONAR Multi-Domain Monitoring Service for LHCOPN.
- GN2-07-309 perfSONAR Multi Domain Monitoring Service for LHCOPN: Service Overview and Site Responsibilities.

A link to the LHCOPN monitoring can be found below:

- [http://e2ems.geant2.net/mon/G2\\_E2E\\_index\\_PROD.html](http://e2ems.geant2.net/mon/G2_E2E_index_PROD.html).

### 3.1.3 GÉANT2 Point-to-Point Circuits Implemented

- 10Gbps LHC Circuits Currently Operational:
  - SURFnet-CERN –connecting SARA, Amsterdam (rerouted December 2007 to provide diversity).
  - SURFnet-CERN –connecting FNAL, USA.
  - SURFnet-CERN –connecting ASGC, Taiwan.
  - SURFnet-CERN for TRIUMF, Canada
  - DFN-CERN –connecting the University of Karlsruhe.
  - GARR-CERN –connecting INFN, Bologna.
  - JANET-CERN –connecting RAL, Oxford.
  - NORDUnet-CERN, connecting the distributed Nordic Tier1.
  - SURFnet-CERN –connecting USLHCnet, USA.
  - REDIRIS-CERN –connecting PIC, Barcelona.
- GÉANT2 LHC 1Gbps Circuits Currently Operational:
  - DFN-CESNET –connecting the Universities of Karlsruhe and Prague.
  - RENATER-ESNET –connecting FNAL, USA and IN2P3, Paris (via Paris-NY circuit).
  - RENATER-ESNET –connecting FNAL, USA and IN2P3, Paris (via London-NY circuit).
  - JANET-SURFnet –connecting the University of Essex to SARA.

## 3.2 DEISA

### 3.2.1 Background

DEISA is a consortium of leading national supercomputing centres in Europe. It aims to jointly build and operate a distributed terascale supercomputing facility. The project consists of several phases.

The first phase was a proof of concept, carried out during 2004-5. In 2004, four supercomputing sites were connected, followed by another three in a second phase. Initially each end site was connected to its local national research and education network (NREN) with a dedicated gigabit Ethernet connection. The network connectivity is based on routed IP. Within the GÉANT2 network, MPLS LSPs with a Premium class of service were used to control the routing in order to prevent any possible impact on the best-effort service in case of route changes.

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### 3.2.2 User Support Provided

The star structured OPN provided by the GÉANT2 partners to DEISA remains operational, and attention has now turned to the performance monitoring of the multi-domain links provided.

A teleconference and some face-to-face meetings were held with Ralph Niederberger of DEISA to discuss the adoption of perfSONAR monitoring tools on the DEISA P2P circuits. It was agreed that a limited implementation would take place as a trial. A specific request to fund OPN-wide monitoring will be included in the DEISA2 proposal to the European Commission.

### 3.2.3 GÉANT2 Point-to-Point Circuits Implemented

The following GÉANT2 10Gbps point-to-point circuits have now been established between NRENs hosting DEISA sites and the central DEISA hub in Frankfurt:

- SURFnet-DFN –connecting SARA, Amsterdam.
- RedIRIS-DFN–connecting BSC, Barcelona.
- RENATER-DFN –connecting IDRIS, Orsay
- JANET-DFN –connecting HPCx, Daresbury
- NORDUnet-DFN –connecting CSC, Finland.
- GARR-DFN –connecting CINECA, Bologna.

## 3.3 eVLBI

### 3.3.1 Background

The European VLBI Network (EVN) is the collaboration of major radio astronomical institutes in Europe that works together on the data collected by an array of European radio telescopes. The EVN also works with similar institutes in Asia and South Africa. VLBI (very long baseline interferometry) is a technique that involves the collection of simultaneous observations from these telescopes. Data is then correlated to form very sharp, high-definition images.

GÉANT2 is supporting the work of the EVN through the provision of network resources to allow rapid data transfer. Before it began working closely with GÉANT, data was collected at each telescope on magnetic tapes. The tapes were then transported by courier to the central correlator at the Joint Institute for VLBI in Europe (JIVE) in Dwingeloo, the Netherlands - a journey that could take up to six weeks.

If any of the telescopes were malfunctioning, it would be weeks before the problem was diagnosed. In addition, exciting astronomical events were often over before astronomers even knew of their existence.

The use of GÉANT and the NRENs in participating countries enables significantly faster processing and correlating of radio telescope data. Data can now be transferred almost instantaneously using the NRENs and GÉANT. It can therefore be immediately correlated and processed, producing images in near-real time.

### 3.3.2 User Support Provided

During 2007 a total of four European telescopes connected to JIVE via GÉANT2 point-to-point circuits: Jodrell Bank and Cambridge (UK), Torun (Poland) and Medicina (Italy). These circuits have been implemented smoothly and have been used successfully in service.

GÉANT2 and ORIENT provided connectivity (together with National Research Networks) between JIVE and the Shanghai Radio Observatory for a demonstration at the APAN meeting in August 2007. The demonstration proved highly successful, and Chinese Radio Astronomers are keen to establish this as a permanent route for eVLBI traffic.

The EXPReS work package FABRIC was supported by the hosting of two PCs at the GÉANT2 London PoP and providing access to the GÉANT2 testbed for data transfer tests. This work was very successful and resulted in a highly complementary presentation at TNC2007. In the latter part of 2007 a requirement to utilise GÉANT2 capacity to test high-speed applications as part of FABRIC was formulated. Initially a 4Gbps path has been configured from the PC located at the London GÉANT2 Testbed node to a similar PC in Stockholm. It is planned to migrate this service to cover the full path between Jodrell Bank (UK) and Onsala (SE) through the cooperation of JANET, NORDUnet and SUNET.

The 5th EVN-NREN Forum meeting between the networking and radio-astronomy communities took place in Bonn in conjunction with the International eVLBI Workshop. The connection of a number of 'new' radio observatories (such as Effelsberg and Madrid) to NREN backbones was discussed along with the challenges of connecting the application at ever-higher data-rates.

The EXPReS EVN-NREN email list has been maintained and appropriate new members solicited –notably in Latin America, the USA and Japan. A number of new subscribers have agreed to join the list.

### 3.3.3 GÉANT2 Point-to-Point Circuits Implemented

- JANET-SURFnet –(1Gbps) connecting Jodrell Bank to JIVE.
- JANET-SURFnet –(1Gbps) connecting Cambridge to JIVE.
- PSNC-SURFnet –(1Gbps) connecting Torun to JIVE.
- GARR to SURFnet –(1Gbps) connecting Medicina to JIVE.
- GÉANT2 Testbed-NORDUnet –(4Gbps) test circuit from London to Stockholm.

## 3.4 Phosphorus

### 3.4.1 Background

The Phosphorus project is the creation of a network testbed using a number of GÉANT2 point-to-point connections. This will be used to develop and test software tools for end-to-end, on demand provisioning of network services, and to facilitate the integration of data storage and other resources in a multi-domain environment. The project contains several GÉANT2 partners and thus has proved a quick adopter of GÉANT2 circuit services.

### 3.4.2 User Support Provided

Phosphorus has been provisioned with a number of point-to-point circuits, using GÉANT2 circuit capacity. In addition an MLPS path was set up over the GÉANT2 IP network between Madrid and Poznan for the use of Phosphorus.

### 3.4.3 GÉANT2 Point-to-Point Circuits Implemented

- PSNC to CANARIE –(1Gbps) Connecting CRC to PSNC\*.
- SURFnet to PSNC –(1Gbps).
- JANET to PSNC –(1Gbps) Connecting the University of Essex to PSNC.
- JANET to SURFnet –(1Gbps) Connecting the University of Essex to SURFnet.
- DFN to SURFnet – (1Gbps) Connecting Juelich to SURFnet.

\* **Note:** This interconnection was achieved due to both GÉANT2 and CANARIE having a presence at the MANLAN Exchange Point in New York.

## 3.5 EGEE

The EGEE Network Operations Centre (ENOC) were given special access to the GÉANT2 Advance Multi-domain Provisioning System (AMPS), which is normally limited to NREN Access Port Managers (APMs). Having access to AMPS means that ENOC staff can make Premium IP reservations spanning multiple domains (which is to say, those networks such as GÉANT2 which support multi-domain Premium IP).

DANTE took part in TERENA's GRID Workshop in June 2007 and gave a presentation on the perfSONAR E2E monitoring toolset.

DANTE was represented at the Feb 07 TNLC held in CERN. A presentation was given on the current state of the Advance Multi-Domain Provisioning System (AMPS), and multi-domain Premium IP (PIP). The idea of a

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common Trouble Ticket (TT) exchange format was promoted, the aim being to simplify and improve the flow of network maintenance information to the ENOC (and potentially other organisations).

## 4 Related Dissemination Activity

- A brochure describing the hybrid structure of GÉANT2, the point-to-point services that the network offers and some user case-studies illustrating the potential of such technologies. This brochure was fully described in deliverable DN2.0.3,7 and can be requested on-line at:

<http://www.geant2.net/server/show/ConForm.50>

Recent GÉANT2 press releases specifically highlighting user applications of the GEANT2 network include:

- GÉANT2-DEISA joint press release on the use of dedicated wavelengths by the DEISA project (14<sup>th</sup> June 2007).
- GÉANT2-EXPreS joint release on the use of point-to-point circuits (30 October 2007).

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## 5 Related Documents

- DN3.0.2: A proposal for the organisation of user support for demanding users.
- DS3.3.2: GÉANT2 Performance Enhancement and Response Team (PERT) User Guide and Best Practice Guide.
- [http://lcg.web.cern.ch/lcg/C-RRB/MoU/WLCGMoU\\_August2.pdf](http://lcg.web.cern.ch/lcg/C-RRB/MoU/WLCGMoU_August2.pdf)
- PUB-06-151v3 Report Describing Research Network Support for eVLBI Tracking of the SMART-1 Spacecraft.
- DN3.0.5 Processes and Provision of Point-to-Point Services.
- GN2-08-064 GÉANT2 Network Service Definitions (in preparation).

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## 6 Conclusions

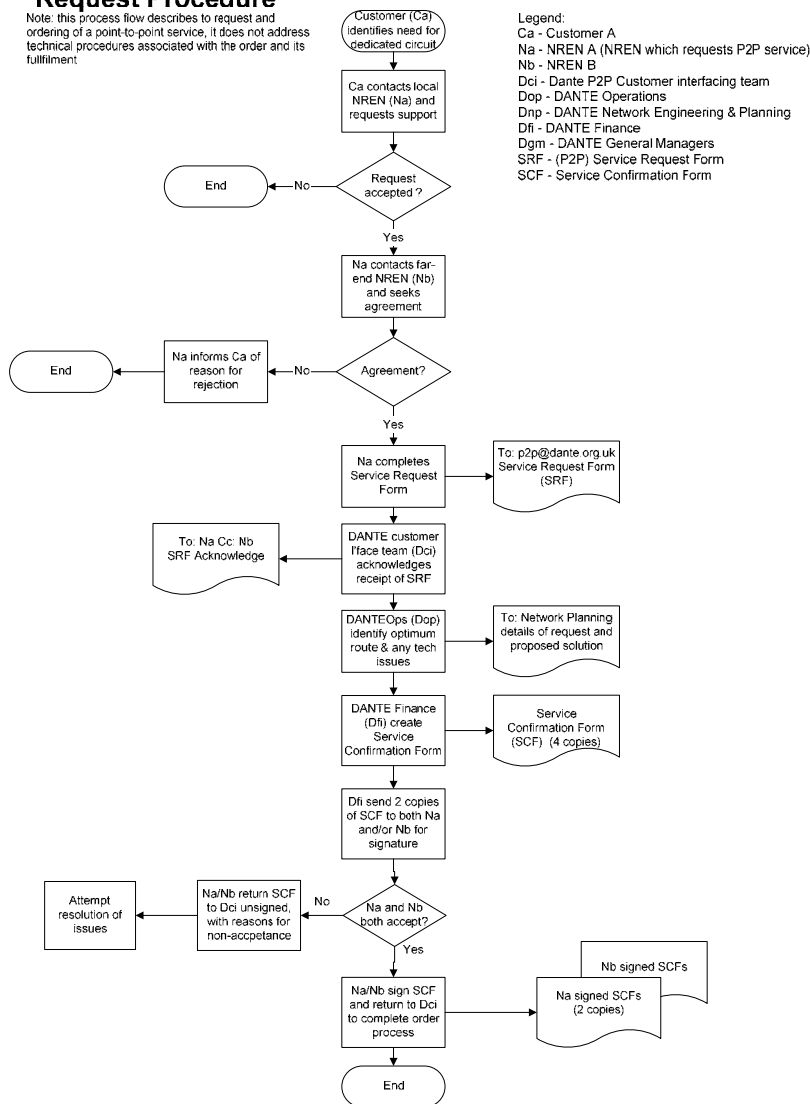
From the descriptions of our users, those who demand exceptionally high speeds of reliable data transmission, it is obvious that such demands will become more and more commonplace.

GÉANT2 has shown that it is the backbone for such requirements. The improvements to support services here illustrate that the action plan for improving and delivering support functions has worked with a considerable degree of success. The future developments included in the action plan indicate that the GÉANT2 support teams understand that they cannot stand still. As GÉANT2 and its successors develop to meet the increasing demands of more and more demanding customers, the support services must also develop to match their needs of a reliable, super-fast data network.

# Appendix A P2P Service Request Procedure

## GÉANT2 P2P Service Request Procedure

Note: this process flow describes to request and ordering of a point-to-point service, it does not address technical procedures associated with the order and its fulfillment



- Legend:
- Ca - Customer A
  - Na - NREN A (NREN which requests P2P service)
  - Nb - NREN B
  - Dci - Dante P2P Customer interfacing team
  - Dop - DANTE Operations
  - Dnp - DANTE Network Engineering & Planning
  - Dfi - DANTE Finance
  - Dgm - DANTE General Managers
  - SRF - (P2P) Service Request Form
  - SCF - Service Confirmation Form

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## Appendix B **Point to Point Circuits: Request Form**

The on-line Point to point request Form is shown on the pages that follow.

Please note that the NREN requesting the service (NREN-A) should complete the form to cover both sites A and B.

This Service Request Form will be used to prepare a Service Confirmation Form (SCF). The SCF will form the basis of a legally binding contract between the organisations named below and DANTE.

Please see Appendix C "Service Request Form: Help Text" for a full description of the help text available when using this form.

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Home Request P2P Circuit Check Status Admin Help

**Point to Point Circuits : Request Form**

**NOTE : NREN requesting the service (NREN-A) - This person should complete the form covering both sites A and B.**

This Service Request Form will be used to prepare a Service Confirmation Form (SCF).  
 The SCF will form the basis of a legally binding contract between the organisations named below and DANTE.

**Bold** fields are required.

**- NREN Details ?**

	<b>NREN-A</b>	<b>NREN-B</b>
<b>Contact Name</b>	<input type="text"/>	<input type="text"/>
<b>Organisation</b>	<input type="text"/>	<input type="text"/>
Position	<input type="text"/>	<input type="text"/>
Telephone	<input type="text"/>	<input type="text"/>
<b>E-Mail</b>	<input type="text"/>	<input type="text"/>

**- Billing Contacts (only if different from above)**

Name	<input type="text"/>	<input type="text"/>
Organisation	<input type="text"/>	<input type="text"/>
Position	<input type="text"/>	<input type="text"/>
Telephone	<input type="text"/>	<input type="text"/>
E-Mail	<input type="text"/>	<input type="text"/>

**- Project Details ?**

Project Name	<input type="text"/>
Project Field	<input type="text"/>
Project Description	<input type="text"/>

**- User End Sites to be connected ?**

<b>Organisation Name</b>	<input type="text"/>	<input type="text"/>
<b>Site Name</b>	<input type="text"/>	<input type="text"/>
<b>Contact Name</b>	<input type="text"/>	<input type="text"/>
<b>Telephone</b>	<input type="text"/>	<input type="text"/>
<b>E-Mail</b>	<input type="text"/>	<input type="text"/>

Calendar

Calendar

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**- Date Required ?**

Start Date (DDMMYYYY)

End Date (DDMMYYYY)

Detail any further P2P services required for this project

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**- Technical Details ?**

GN2 Access Point	<input type="text"/>	<input type="text"/>
Technical Contact Name	<input type="text"/>	<input type="text"/>
Telephone	<input type="text"/>	<input type="text"/>
E-Mail	<input type="text"/>	<input type="text"/>
Total Capacity (Gbps)	<input type="text"/>	
Service Type	<input type="text" value="Select Service Type"/>	<input type="text" value="Select Service Type"/>
Interface Type	<input type="text" value="Select Interface Type"/>	<input type="text" value="Select Interface Type"/>
Optical Description	<input type="text"/>	<input type="text"/>
VLAN ID (if applicable)	<input type="text"/>	<input type="text"/>
SDH VC4 Time Slots ?	<input type="text"/>	<input type="text"/>

Is a redundant circuit required for protection?  
 Yes  No

**Additional Information ?**

Remarks/Comments

---

**- Payment ?**

Cost Sharing ?



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## Appendix C **Service Request Form: Help Text**

This file provides information to assist you in completing the point-to-point service request form:

- [NREN Details](#)
- [Project Details](#)
- [User End Sites to be Connected](#)
- [Date Required](#)
- [Technical Details](#)
- [Additional Information](#)
- [Payment](#)

### 6.2 **NREN Details**

- Fill in the name and full contact details of the employee responsible for the request at your NREN (A-end) and the NREN at the B-end of the circuit.
- Fill in the names of the NRENs that the circuit will connect Billing Contacts.
- Please supply the name and contact details of the NREN employees to whom the service confirmation form and invoice should be sent for this service.

### 6.3 **Project Details**

- Give details of the research or education project that has requested the service.
- List the project name and the field of research or education.
- Describe briefly the project and its use of R & E networks.

### 6.4 **User End Sites to be Connected**

- Give details of the end institutions which have requested this service.
- Give the name of each site (university, research institution, school etc).

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- Give a technical or project contact at each site.

## 6.5 Date Required

- State the date when the GÉANT2 section of the end-to-end circuit is required to be handed over for service. Bear in mind that new 10Gbps circuits require a 14 week lead time from ordering. GÉANT2 circuit services (of sub-10Gbps capacity) can be delivered within 10 working days of ordering, if no new interfaces are required and subject to NREN subscription capacity.
- If known, please state the end-date for the service. If this is unknown, one month's notice must be given to cancel any circuit.
- Detail any other known P2P circuits in use or planned by this project.

## 6.6 Technical Details

- Give details of the GÉANT2 PoPs which are used to access this circuit.
- Give contact details of the NREN engineers responsible for implementing the circuit.
- Give the total capacity of the circuit (usually 1Gbps or 10Gbps).
- Choose the type of service from the drop-down list. For full details of these services, see the document: GÉANT2 Point-to-Point Services: A Guide for NRENs?
- Define the interface types and optics required at each end of the circuit, within the available types. Note that ordering new interfaces or optics typically requires a 14 week lead time. NREN patch cards must match the following specification to interface with GÉANT2 equipment - Connector type:
  - E2000/APC (Single mode).
  - E2000/PC (Multi mode).
- If VLAN IDs are required, please specify them here.
- If specific SDH time slots are required, please specify which. If left unspecified, the next available VC4 slots will be utilised.
- If a redundant circuit is required, please specify. An additional route will be designated, offering the most robust routing possible on the GÉANT2 footprint. There will be an additional charge for the redundant capacity.

## 6.7 Additional Information

- Please add free-form text to specify any special requirements or constraints.

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## 6.8 Payment

- Please specify the payment split between the two NRENs. It should be expressed as two percentages, summing to 100%. In the case of circuits utilising available GÉANT2 circuit capacity, no additional charge will be made.