GÉANT

CONNECT

THE MAGAZINE FROM THE GÉANT COMMUNITY | ISSUE 14 JANUARY 2014

HUMAN BRAIN PROJECT

GÉANT AND THE WORLD'S MOST AMBITIOUS NEUROSCIENCE PROJECT

CONNECT INTERVIEW: WE SPEAK TO MARYLINE LENGERT OF THE EUROPEAN SPACE AGENCY

FEDERATING SERVICES: EDUGAIN FURTHER EXPANDING ITS GLOBAL FOOTPRINT

DATA INTO MUSIC: TRANSFORMING VOYAGER SPACECRAFT DATA INTO A MUSICAL DUET

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CONNECT is the quarterly magazine from the GÉANT community; highlighting key areas of interest, updates on the project and its vital work supporting European research and education. We give insights into the users who depend on the network, and the community that makes GÉANT what it is. We welcome feedback at **connect@geant.net**

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WELCOME FROM THE EDITORS

Welcome to the first CONNECT of 2014! This year promises to be another busy one, as GÉANT continues its 'excellent' work (see page 2) in supporting European research and innovation, linking researchers, students and innovators across the world with the best connected network, and increasingly supporting them with advanced user-focused services from the GÉANT Services Portfolio (see pages 16-20).

More and more research projects, universities and institutes are coming to rely on GÉANT and cover an ever more diverse range of disciplines and applications: from data sonification techniques which turn data into sounds to improve detection (page 3); low latency technology to enable musicians across the world to play together as if standing inches apart (page 6); to nuclear fusion energy research to seek sustainable energy (page 48).

It's therefore more important than ever that GÉANT continues to be guided by users, so CONNECT spoke to Maryline Lengert of the European Space Agency (page 4) to better understand her role as Chair of GÉANT's International User Advisory Committee (IUAC) and what it means for the project. The IUAC also includes a representative from the Human Brain Project, an EU flagship initiative which is helping to put Europe at the forefront of research, and which we feature on page 10 of this issue.

Behind the network, services and innovation are the people who make GÉANT what it is. CONNECT continues its Q&A series (page 8) with a look at the team that helps to ensure GÉANT project participants are fully equipped to keep pushing this excellent project forward; and we speak to the software developers (page 26) who recently honed their skills at a very special summer school!

Finally, preparations are underway for GÉANT's participation in the TERENA Networking Conference (TNC2014) which welcomes a global audience, many of whom are interconnected by GÉANT, and at which representatives of our Open Call program – an initiative to drive innovation and engage with industry – will be present. For more information, see page 14 and the upcoming April issue of CONNECT which will focus on TNC.

Until then, we hope you enjoy this issue and as always we welcome your feedback. You can reach us at **connect@geant.net**

Editors
Paul Maurice & Tamsin Henderson

GÉANT PROJECT RECEIVES ‘EXCELLENT’ ACCOLADE FROM EUROPEAN COMMISSION

INDEPENDENT REVIEW AWARDS HIGHEST RATING TO EUROPEAN PROJECT

For the second year running, the GÉANT project, which operates the high-speed data network serving 50 million research and education users across Europe, has received ‘Excellent’, the highest possible rating in a European Commission review. This puts GÉANT in the top 10% of all EC-funded projects.

The review focused on the GÉANT project (GN3) which ran from 2009 to 2013, and is succeeded by the current GÉANT project, GN3plus.

The GÉANT network is among the world’s most advanced networking infrastructures. It interconnects Europe’s National Research and Education Networks (NRENs) and provides worldwide connectivity to some of the biggest science projects of our time: from nuclear fusion research to sequencing the human genome, health, high-energy physics, deep-space research, food security and geohazards.

Research and innovation increasingly relies on massive amounts of data and the remote teams who collaborate on that data, making the 500Gbps GÉANT network and its associated services vitally important.

Matthew Scott and Niels Hersoug, Joint Project Managers of GÉANT said:

“The last four years have seen a step change in how the network and its services facilitates innovation within the European R&E community. This gives us the ability to remain one step ahead of growing data needs. It is an incredible achievement from all the project participants and fantastic to have all that effort formally recognised.”

The achievements of the GÉANT Project (GN3) have been summarised in a 4 page paper – to view a PDF copy visit the Media Centre at **www.geant.net**

THE SOUND OF SPACE DISCOVERY

GÉANT HELPS TO TRANSFORM VOYAGER DATA INTO A MUSICAL DUET

As an accessible way to demonstrate the power of high speed networks for research and education, GÉANT included a fascinating demonstration at the NASA booth, at Supercomputing (SC13) in November. Domenico Vicinanza, who is GÉANT’s Network Services Product Manager and also holds the role of Arts and Humanities Manager combined data sonification techniques and a love of music to transform 36 years’ worth of NASA Voyager spacecraft data into a fantastic musical duet.

WHAT IS VOYAGER?

Launched in 1977, both Voyager 1 and Voyager 2 are now decommissioned but still recording and sending live data to Earth. They continue to traverse different parts of the universe, billions of kilometres apart. Voyager 1 left our solar system last year, becoming the first human-made object to enter the previously unexplored interstellar space. It is claimed to have travelled further than anyone, or anything, in history. To learn more, search on NASA Voyager.

Commenting on the duet, Domenico said:

“I wanted to compose a musical piece celebrating the Voyager 1 and 2 together, so used the same measurements (proton counts from the cosmic ray detector over the last 36 years) from both spacecraft, at the exact same point of time, but at several billion km apart. I used different groups of instruments and different sound textures to represent the two spacecraft, synchronising the measurements taken at the same time.”

The result is an up-tempo string and piano orchestral piece. You can listen for yourself at GÉANT’s SoundCloud channel: **https://soundcloud.com/GEANT-sounds**

PROFILE RAISING

The musical score has now been made available through GÉANT’s social media sites, and the world’s media have flocked to the story – including coverage in the UK’s mainstream titles The Guardian, The Telegraph and the Daily Mail (a combined audience of nearly 40 million), as well as on BBC Radio 2 and the Today Programme on BBC Radio 4. Further afield, coverage appeared in tech stalwarts GigaOm, Wired, ANSA, New York Times Science and many more, representing a further 5 million readership.

The popularity of this story (and Domenico’s sonification of the Higgs-like Boson) reinforces the public‘s continued fascination with science and outer space, and how, by making high profile scientific events such as these more accessible and fun, it raises the profile of both scientific discovery as well as underlining the role of GÉANT and other high speed networks in supporting them.

Picture
Courtesy of NASA

HOW WAS IT DONE?

320,000 measurements were first selected from each spacecraft, at one hour intervals. Then that data was converted into two very long melodies, each comprising 320,000 notes using different sampling frequencies, from a few KHz to 44.1 kHz.

The result of the conversion into waveform, using such a big dataset, created a wide collection of audible sounds, lasting just a few seconds (slightly more than 7 seconds at 44.1kHz) to a few hours (more than 5 hours using 1024Hz as a sampling frequency). A certain number of data points, from a few thousand to 44,100 were each “converted” into 1 second of sound. Using the grid computing facilities at EGI, GÉANT was able to create the duet live at the NASA booth at Super Computing 2013 using its superfast network to transfer data to/from NASA.

INNOVATION BY DESIGN

GÉANT NETWORK SHAPED BY SCIENCE

Q&A WITH MARYLINE LENGERT

CHAIR OF GÉANT INTERNATIONAL USER ADVISORY COMMITTEE (IUAC)

Maryline Lengert, Senior Advisor in the IT department of the European Space Agency, is co-leader of Helix Nebula, the Science Cloud initiative. This is a new pioneering partnership between big science and big business in Europe, charting the course towards the sustainable provision of cloud computing.

GÉANT is one of the active participants of this initiative and is providing ESA with the necessary connectivity to build a discovery-driven ecosystem bringing together data, scientists and tools. Maryline has 20+ years of experience in the IT domain within an international environment. She holds a PhD in Physics and a Master in International and European Studies.

Interview by Tamsin Henderson, Marketing Officer, DANTE

GÉANT exists to facilitate innovation and discovery throughout Europe. The projects' terabit network has transformed the way researchers collaborate, and is now as much a focus for European innovation as the research itself.

To ensure this vast, transformative project continues to stay one step ahead of user needs, GÉANT has brought together 11 key members from the international research community to form the International User Advisory Committee (IUAC).

Meeting every quarter, the IUAC provides valuable external user input to assist with the development of future policies and practice within GÉANT. Its goal? To give European researchers the cutting-edge infrastructure they need for harnessing big data in their search to address society's grand challenges.

Here Maryline Lengert, Chair of the IUAC explains how.

PLEASE TELL US ABOUT YOUR KEY OBJECTIVES FOR THE IUAC

Looking at the committee composition, I think that the International User Advisory Committee could be quite instrumental in supporting GÉANT in being recognized as an innovation engine for connectivity. I expect the group to provide challenging requirements to the GÉANT project, leading to edge of technology services for the research environment. This committee can also help GÉANT to prepare for the Big Data explosion and explore the way towards long-term sustainability.

WHAT DOES THE IUAC MEAN FOR THE GÉANT PROJECT?

The IUAC has been newly created. It's the first time the GÉANT project has involved users in its governance, which will bring a new perspective with concrete challenging use cases.

The committee covers knowledge and expertise of large international collaborative projects and institutions that request the implementation of many-to-many cross-border (across national borders) relationships. These requirements call for a new connectivity service paradigm.

As a group, we can help in prioritising the investment required to reach our connectivity needs, proposing trade-off between innovation and extension, between network and services.

FROM A USER PERSPECTIVE, WHAT DO YOU SEE ARE THE BIGGEST CHALLENGES FOR GÉANT?

The biggest challenge I can see as an international user, is to have seamless cross-border connectivity that allows us to access computing power (including Grid, Cloud and HPC), data repository and tools spread all over the planet. This federated environment will put strong requirements on connectivity, security and integrity, in particular in the big data context.

As stated in the GEG report* – Knowledge without Borders: "GÉANT should act as the European communications commons where talent anywhere is able to collaborate with their peers around the world through instantaneous and unlimited access to the right resources".

As members of the IUAC members, we will do our best to contribute, helping GÉANT to reach this ambitious objective.

WHAT ARE YOUR THOUGHTS ON THE FUTURE OF RESEARCH NETWORKS AND HOW THEY SUPPORT USERS?

Research networks require connectivity of large data volumes over large distances. Future research networks need to bring together globally spread data sources to be usable securely on research work benches, at any time. Despite the ever increasing data volumes, high speed data access needs to be ensured.

Future research networks will not remain in an isolated R&D environment. Research and industry need to work together to benefit the European Market and to bring sustainability in the research sector. There should be active technology transfer from research to the ICT industry to help build a secure operational network relying on both public and private assets.

Finally, the Internet of things will soon enter the research domain calling for the need for integration of wireless and wired-connected data transfer, as well as machine to machine communication. A lot of challenging work ahead of us!

*The GÉANT Expert Group (GEG) report "**Knowledge Without Borders**" was written by independent group of experts appointed by the European Commission. It articulates a 2020 vision for European research and education networking and identifies an action plan. The report is used to strongly influence European Union (EU) policy regarding ICT and the role and continued development of e-Infrastructures in achieving the vision of the European Research Area.

MEMBERS OF THE IUAC ARE:

CERN
The European Organization for Nuclear Research

CLARIN
Common Language Resources and Technology Infrastructure

ELIXIR
Unites Europe's leading life science organisations in managing and safeguarding the massive amounts of data generated every day by publicly funded research

EMBL
The European Bioinformatics Institute

ESA
European Space Agency

EUDAT
European Data Infrastructure

EUMETSAT
Monitoring weather and climate from space

Human Brain Project
Understanding the human brain

ITER
The search for fusion energy

JIVE
Joint Institute for VLBI in Europe

PRACE
Partnership for Advanced Computing in Europe

ALL THE WORLD'S A STAGE!

HIGH-SPEED NETWORKS ARE TRANSFORMING GLOBAL ARTS AND HUMANITIES

Have you ever tried singing Happy Birthday over Skype? It's pretty dismal. So imagine coordinating a live performance between groups of professional musicians in different continents - made doubly nail-biting because they're performing in front of a global audience. Oh, and did I mention they're improvising? Noticing subtle variations in each other's tone and tempo is key to blissful audio rapture… or ear-splitting disaster.

Thanks to very high capacity networks such as GÉANT and high definition, low latency technologies, artists can now see and hear each other so well, the creative tension is palpable. Today some truly jaw-dropping simultaneous collaborations are taking place, where distance is irrelevant and imagination the only barrier to what can be achieved. This is the future of performing arts across boundaries.

MERGING ART AND TECHNOLOGY

E-Culture and e-Arts are digitalising the traditional arts, bringing us video art, net art and even 'serious gaming'. People can interact across the globe in real time, sharing vast amounts of digital information such as manuscripts, artefacts or paintings.

From remote auditions to expert master classes, just think of the possibilities! World-class orchestras can collaborate with laptop musicians across different time zones. Beyoncé could perform at Glastonbury without stepping on a plane! Carbon footprints will reduce. Air miles will drop. And let's not stop at music. Remote, digital stages enable dancers not only to perform but to interact with each other. New languages can be developed in the performing environment.

BEING 'VIRTUALLY' PRESENT

The implications go far beyond arts and humanities. Telepresence, the technology enabling a person to feel present at a virtual location, has benefits to health (remote surgery), disaster recovery (bomb disposal, mining), environmental research and so much more. The sky is the limit, in fact even deep space research is using telepresence to place human dexterity in places too dangerous for the living.

In a world where resources are ever-shrinking and low-carbon living critical, very high-capacity networks such as GÉANT are closing the gap between those with knowledge and those who need it, creating a global studio and classroom.

Words
Tamsin Henderson, Marketing Officer, DANTE

Picture
On-site and remote musicians perform together at TNC2013.

HOW DOES GÉANT SUPPORT e-ARTS?

LoLA

LoLA (LOw LAtency audio/visual system) was developed by GARR - the Italian National Research and Education Network (NREN) - and its cohorts. GÉANT helped deliver the project's vision and today, LoLA and partners can beam performers to each other with a latency of 20-50 milliseconds; roughly the time it would take the sound to reach a musician on one side of a stage to the other, but with video.

eMUSIC

eMusic is a project coordinated by the Czech NREN, CESNET, under the GÉANT Innovation Programme. It aims to demonstrate a novel use of the GÉANT bandwidth on demand (BoD) service to support e-Learning and remote access to cultural performances. It is hoped the impact will open possibilities for teachers and students, and artists in general. New education paradigms could be developed, integrating traditional face-to-face training with remote sessions. This is where the global exchange of experiences can truly widen horizons.

ASTRA

In 2006, GÉANT worked with the ASTRA (Ancient instruments Sound/Timbre Reconstruction Application) project which recreates the sounds of ancient musical instruments using highly data intensive physical modelling programs.

GÉANT provided the bandwidth required to harness the power of grid computing to greatly accelerate the modelling process, bringing to life the Epigonion and Barbiton to produce a fascinating insight into music history.

DATA SONIFICATION

GÉANT recently demonstrated the power of its networks by sonifying data from NASA's Voyager 1 and 2 spacecrafts, to an awe-struck audience at the NASA booth at Supercomputing 2013.

The project used data sonification - representing data by means of sound signals – itself increasingly used to accelerate scientific discovery; from epilepsy research to deep space discovery. See page 3 for more.

MIXING ART AND TECHNOLOGY

Even world-class artists' are increasingly embracing digital art. David Hockney, free of having to carry paints and pencils everywhere he goes is now exhibiting his iPad art. Add high-speed networks to the mix and you have a powerful tool connecting artists with multiple computing resources.

Partly developed by artists, partly by engineers, e-Art reimagines the relationship between people and art and allows studios to tap into geographically dispersed, rich and varied talent pools without the need for a fixed location.

HIGH-SPEED NETWORKS RESHAPING OUR WORLD

The unstoppable juggernaut that is Massive Open Online Courses or MOOCs, is another way in which high-speed networks are reshaping our world. Learning is no longer only for those who can afford it, or for those who live close to a specific institution. Here virtual communities share resources, using peer review or crowd sourcing for guidance, in a way that is flexible, open and free.

And, with technology and data needs continually changing and improving, we're likely to see even bigger changes as the world discovers new ways of collaborating through the sharing of data over high-capacity networks. It seems we're only just scratching the surface with what can be creatively and technologically achieved.

Q&A TRAINING AND SHOWCASES

IAN BARKER AND JIM BUDDIN ARE THE GÉANT TRAINING COORDINATORS. HOW DOES TRAINING FIT INTO THE WIDER GÉANT PICTURE? CONNECT MET UP WITH THEM TO FIND OUT.

WHY ARE THERE TWO GÉANT TRAINING COORDINATORS?

Jim: We are a small but effective team. For years I have been organising TERENA's training events and workshops for the research and education networking community. My background is in logistics and events organisation, and I recently attained a qualification in planning, designing and delivering training.
Ian: My background is in learning development, with many years designing management and leadership courses. Our combined experience and expertise means we can deliver effective learning experiences for GÉANT.

HOW LONG HAVE YOU BEEN A PART OF GÉANT?

Ian: 3 years.
Jim: I have worked for TERENA for 9 years with a supporting role in GÉANT, but this is my first official project role.

WHAT KIND OF TRAINING DO YOU PROVIDE?

Jim: It can be specific technical training or more general training for a wider audience.
Ian: For example, in 2013 we ran courses in 'Secure Coding for Developers', to raise awareness of coding-related security issues; and separately in 'Leading High Performance Virtual Teams', which gave Activity Leaders and Task Leaders useful leadership and communications skills.
Jim: We have also recently started GÉANT Showcase sessions. These are weekly webinars in which project participants learn about different aspects of the project. We think this can be a really useful communication tool within the project, and even for people outside it. Afterwards we post the video on GÉANT TV so the wider community can access and learn from the showcases. So far we've covered Open Calls, the terabit network and eduPERT.

HOW ARE THE NEW SHOWCASE WEBINARS GOING?

Ian: Very well! We are continually developing the format and ensuring it meets the requirements of viewers, and of course we always welcome more topics!
Jim: It's potentially a really exciting way to open up collaboration opportunities and to improve 'human networking' across what is a very large project.

WHAT IS INVOLVED IN DESIGNING A TRAINING COURSE?

Ian: Time is the most underestimated factor. People tend to use the 'Death by PowerPoint' approach. We're very keen to move past that and for effective training much more is required.
Jim: There are a number of techniques, lots of studies and plenty of approaches to choose from. Finding the best fit according to the training requirements takes time. We look at specific knowledge gaps and how best to deliver the required messages and make them stick.
Ian: We also work with external trainers and providers to tailor courses as much as possible to GÉANT needs.

HOW DOES THIS WORK IN PRACTICE?

Jim: We consult Activity Leaders and the Product and Project management teams to assess needs, and project participants have the opportunity to suggest training.
Ian: For GÉANT services or products, we work with Activity or Task leaders to develop a course that provides the required knowledge transfer. All requests go into a 6-month rolling plan. 'Train the trainer' is another part of our role, which assists the spread of knowledge within the NREN community.
Jim: We can negotiate special rates from training providers and help spread take-up throughout the project. We can usually also help with funding for delegates and trainers to attend courses, hiring external trainers and course materials and so on.

WHAT ARE THE MAIN CHALLENGES?

Ian: I think it's the fact that GÉANT project participants are spread across Europe, and therefore we have to find locations to suit the maximum number of trainees. Creating space in people's diaries so we can help them design and rehearse effective, engaging training sessions can also be a challenge.
Jim: Communication is also a big issue. We need to allow plenty of time for potential attendees to hear about the courses and book travel, so it's another reason to plan well ahead.

WHAT DO YOU ENJOY MOST ABOUT YOUR WORK?

Jim: The people. This community is so broad and is made up of some incredibly talented people.
Ian: Working with colleagues from different countries and cultures

LAST MOVIE YOU WATCHED?

Jim: Bugsy Malone. I never realised how freaky the kids singing with adult voices was when I first watched it!
Ian: The secret Life of Walter Mitty

WHAT ARE YOU READING?

Jim: The Long War by Terry Pratchet and Stephen Baxter
Ian: Bill Bryson; Notes from a small island and Terry Pratchett; Dodger

WHAT'S IN YOUR MUSIC LIBRARY?

Jim: Everything from jazz to classical via Lady Gaga
Ian: Most genres but I suppose mainly 80's rock Pink Floyd, Guns and Roses, Dire Straits

WHAT DO YOU DO FOR DOWNTIME?

Jim: I make things in my shed and I do improvised comedy on Friday nights with easylaughs in Amsterdam, come along if you're ever in town!
Ian: I'm learning to play guitar and drums, really upsetting the neighbours in the flats where I live!

THE HUMAN BRAIN: A RECURRENT NETWORK OF NETWORKS

Article kindly reproduced from iSGTW, authored by Zara Qadir. For more information, see: www.isgtw.org

Scientists from across the globe met in Switzerland in October for the launch of the Human Brain Project. Billed as the world's most ambitious neuroscience project, it seeks to develop methods that will enable a deep understanding of how the human brain operates. The Human Brain Project, coordinated by Henry Markram of Ecole Polytechnique Fédérale de Lausanne in Switzerland, has 135 partner institutions and is co-funded by the EU with an estimated budget of €1.2 billion. The knowledge gained through the project is expected to be a key element in developing new medical and information technologies.

The Human Brain Project is an ambitious EU Flagship initiative to build a working computer model of the human brain by 2023. The project, which will bring together over 80 universities, thousands of scientists, and unspeakably large amounts of data in an enormous collaborative effort, will have a potentially massive impact in areas such as neuroscience, medicine and indeed future computing technology. The fastest supercomputers that currently exist cannot get close to simulating the brain's ability to do complex multiple tasks, and in doing so utilise massively more energy. If future computing can learn from the human brain, the impact on ICT could be game-changing. The substantial budget of €1.2 billion – half funded by the EU – should give the HBP a head start over the US Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative announced earlier this year.

For more information, see: **www.humanbrainproject.eu**

Editor's note: The data handling requirements of a project such as the Human Brain Project are immense, and typical of such a large scale collaboration. Expectations are that the Human Brain Project will rely on Europe's 500Gbps GÉANT network to speed data to collaborators, thereby helping this exciting project to accelerate its research results. Ralph Niederberger represents the Human Brain Project on GÉANT's International User Advisory Committee, helping to provide the perspective of large and important users in shaping the GÉANT network.

Earlier this year, during a presentation at the International Supercomputing Conference (ISC'13), Markus from Germany's Jülich Research Centre (FZJ) provided some insights into the complexities surrounding this epic undertaking. He spoke about his work on simulating a circuit of the whole-brain network and discussed how specialized software can help represent the neurons and synapses of the full circuit.

Diesmann is working on simulating the chattering that occurs between the 86 billion interconnected neurons. In each cubic millimeter of brain tissue there are already around 100,000 neurons, and each one makes contact with around 10,000 other neurons. This means there are around 1,000,000,000 contact points (synaptic junctions) that allow neurotransmitters to pass to another cell.

"The challenge is to organize the computer memory in such a way that one can represent all these contact points," explains Diesmann. "Each nerve cell receives 50% of contacts from inside this cubic millimeter, but the other 50% come from outside their local network." He continues: "This means if you want to make useful statements about the activity in the brain you also have to look at a larger area. As each neuron is interacting with 10,000 others, a simulation on a supercomputer will have the neurons distributed over different compute nodes, and network communication must be highly optimized."

Diesmann is fortunate to have access to Europe's second fastest supercomputer, JUQUEEN, a 5 petaFLOPS system housed at FZJ, and has also used Japan's K supercomputer, which in late 2011 became the first computer to top 10 petaFLOPS. "With K one can roughly generate 109 neurons, but the human brain has 1011 neurons, so with present technology you need a computer 100 times larger than K," says Diesmann. "The brain is of course more complex than our models and nobody knows how much detail we will have to put into the model and which level of description is sufficient." He adds: "If you assume this level of description, we require an exascale system and we are only two orders of magnitude away".

However, the architecture of a supercomputer is still considerably different to a natural neural network because the brain's wiring is in three dimensions. Compare the 10,000 contact points of a neuron with the three contact points of a basic electronic transistor. "There is a huge problem in getting enough wiring on these boards to represent a biological neural network," says Diesmann. "No hardware technology presently squeezes enough cable into the volume, and this is one of the key technical barriers that we have today." Only software simulations can map the 3D connectivity of the brain on to the existing standard computer technology hardware.

NEST (NEural Simulation Tool) is open-source software that can represent many neurons and their contact points. It focuses on the dynamics of neural systems, rather than on the exact morphology of individual neurons. A computational neuroscientist can represent mathematical models of nerve cells, synapses, and network structure in the computer and the software takes care of efficiently parallelizing the simulation on laptops, high performance clusters, or supercomputers. At the technical level there are two stages: the creation of the network and the simulation. Neurons in the central nervous system generate voltage spikes called action potentials, with the timing of these pulses transmitted to the other neurons via the synapses. NEST is ideal for building networks of these spiking neurons.

The number of NEST publications has exploded in the last five years. The NEST Initiative was recently set up as researchers become increasingly interested in full-scale networks, rather than concentrating on individual neurons or small circuits. The software still cited in the majority of publications though is NEURON, which focuses on the detailed description of individual neurons and small networks. NEST is efficient at memory usage and has clever communication strategies for shipping the activity data from one node to another. The idea is that you can solve a few neurons in detail in NEURON, then analyze a larger network using NEST. The simulation engines can also be coupled for multi-scale simulations by MUSIC, which allows simulators to exchange data during run-time. Using these software tools, Diesmann recently co-authored a paper showing that the differences in firing activity in different cell types can be understood on the basis of anatomy.

"The Human Brain Project will be a leader in the creation of new technology for simulation, for visualization and for big data handling in Europe. The Human Brain Project will become a major driver of ICT in Europe."

Prof. Thomas Lippert, Institute for Advanced Simulation, Jülich Supercomputing Centre, leader of the High Peformance Computing subproject

WHAT WOULD HAPPEN IF…

THE GÉANT DISASTER RECOVERY PROJECT

CONNECT CAUGHT UP WITH ANAND PATIL, CHIEF INFORMATION OFFICE, DANTE TO LEARN ABOUT DISASTER RECOVERY (DR) AT GÉANT.

Business Continuity is an increasingly important element of an organisation's strategy. Recovery of IT infrastructures, data, assets and facilities must be planned for, so that a business can quickly resume mission-critical functions in the event of natural, man-made or environmental events.

DANTE, the organisation responsible for managing and monitoring the day-to-day operations of the GÉANT network, operates from two separate locations in Cambridge, UK. The GÉANT Operations Centre is in a separate location to the main DANTE offices but less than a kilometre away.

If the Operations Centre were to become non-functional, disruption could be mitigated by moving to DANTE's main offices and vice versa. But where does the scope of a Disaster Recovery (DR) plan start and end? What would happen if there was a major incident that made both offices non-operational? How would DANTE continue to provide services that are critical to its NREN partners and their research and education users for an extended period of time?

This was the scenario described by a panel of experts at the 2012 European Commission GÉANT project review.

Since then, a lengthy and complex DR exercise has been quietly underway and at last year's EC review, the results of the new strategy were well received. They are now being integrated into all projects managed by DANTE.

Anand Patil tells us why you need a steady nerve to be Chief Information Officer at DANTE.

Defining the scope – How long is a piece of string?

We provide 99.999% availability that supports our National Research and Education Network (NREN) partners and large e-Science projects across Europe, such as CERN and EUMETSAT. So providing an uninterrupted production service to the 50 million users reliant on the network represents a vast challenge. The ability to monitor and manage the network is critical to our business operations and therefore needs to be highly available.

When you try to consider every possible disaster scenario, from unreachable buildings to staff shortages, and lost data and hardware: they all impact business continuity. We had to factor in every underlying system and their inter-dependency - some of which were quite surprising - and look at the worst case situation for each. We also had to take into account HR factors and the procedures required in the event of a disaster.

Our objective was to be able to run and manage the GÉANT network, without offices, for up to six months; the time it would take to rebuild everything from scratch. The scope of a DR plan can be infinite so we had to limit our scope to the defined scenario namely the loss of all our Cambridge offices.

So how did you go about the project?

We identified the people and core systems essential for the day-to-day running of the network and for the GÉANT operations centre staff to function effectively: email, instant messaging and mobile communications, tools to monitor and manage the network, etc.

Then the underlying dependencies that support these core systems. For example, the Configuration Management Database (CMDB) which provides an inventory for our monitoring systems and alarm management dashboard. All of the above and everything in between had to be made highly available.

It was an obvious decision to move mission critical GÉANT applications and service to the 'cloud'. Despite our two locations, we needed to widen the scope. So now, our OSS systems are distributed across Europe. For instance, CMDB is based in France and the Netherlands. Two always-on systems, constantly replicating the other's data, so if one breaks down the other is available immediately.

There are still some systems that are in a single PoP. Anything that still has a single point of failure is potentially vulnerable, for example if an entire POP goes down or becomes isolated. So our second phase is to make these few remaining systems highly available.

Recreating a real-life isolation test

Once we felt we had a robust design, next came the real test. Physically disconnecting the two offices to simulate a real world disaster scenario, was a fairly terrifying but necessary step.

However sure you are of something, you can never be certain until you put the theory to the test! It was a daunting task for the entire DANTE operations team, who were strategically located in internet cafes, homes and offices across the region ready to run through a detailed checklist on the day.

Thankfully only a couple of minor things failed, but most were a success and we were able to iron these out in time for a repeat exercise the following week - yielding a 100% positive result achieving the targeted 'scenario' resiliency. It was such a relief to see all our hard work paying off.

We are now at a stage where we can conduct proactive soft tests every six months and hard tests once a year to check on status. DR has become an even more important part of our strategic planning now, right from procurement through to configuration changes.

Back-ups for scenario resiliency

In the event of a disaster, we can use a meeting room in the London offices of Janet - the UK NREN - as a temporary operations centre. Our goal is to be up and supporting the entire European infrastructure within just 4 working hours.

As I mentioned before, DR cascades to many areas. If someone loses their phone or leaves their laptop at work when disaster strikes, we need stand-by options that can be configured quickly while fitting around staff. Every department could be affected, which could ultimately impact the business operation.

Everything is clearer now

We were constantly surprised at finding new dependences as we went along, so it has been an invaluable exercise in improving our capability to provide an uninterrupted service. We have identified our single points of failure. Delivered a risk assessment of our ability to manage. Of course we haven't solved everything but we are aware of them now. We have a dependency system in place, so naturally our impact analysis is much better. Everything is clearer now.

SPOTLIGHT

GÉANT TO BE WELL REPRESENTED AT TNC2014

The annual TERENA Networking Conference (TNC) is a great opportunity for GÉANT to showcase its activities and touch base with the research and education networking community. At TNC2014, in Dublin, Ireland, 19-22 May, GÉANT will again play a significant role. GÉANT will contribute to the event with multiple papers in a 'distributed session'. These will cover topics on networking architecture, testbed-as-a-service, monitoring, advanced networking, flexgrid, SDN virtual networks and applications, mobility and mobile security, eduroam, simplifying federation deployment, fighting network threats, cloud services, and lots more.

These speakers will be in good company, as the list of keynote presenters shows. Tracy Futhey will address challenges in bringing R&E into the cloud and new educational 'mechanisms'; Barend Mons will talk about big data and informatics; Claire Boonstra will tackle 'education for the future'; Stephen Farrell will report IETF's response to pervasive monitoring; Lord David Puttnam will talk about 'Digital Citizens of Tomorrow'; and Martyn Dade-Robertson will present hidden dimensions of the web in striking artworks.

The full TNC2014 schedule is now available online at tnc2014.terena.org.

NETWORKING WITH THE WORLD

TNC is widely considered to be the best opportunity for experts and managers from research and education networking organisations, universities and industry representatives to meet and exchange ideas. Last year, 650 visitors from around the globe attended, breaking all previous records. The theme 'Networking with the world' is therefore perfectly suited to catch the spirit of TNC2014.

EARLY-BIRD DISCOUNT

Until 24 February it is possible to register at a discounted price of € 550; thereafter registration will cost € 650.

PARTICIPATE IN TNC2014!

It is still possible to submit ideas for poster presentations and lightning talks. Students will also be invited to submit poster proposals in a competition sponsored by Cisco Systems and the Internet Society: the ten best submissions will be rewarded with free attendance at TNC2014, including financial support for travel. The deadline for submitting posters, student posters and lightning talks is 16 April 2014.

There is also the opportunity to show demonstrations or exhibits at TNC2014 – contact: **tnc2014@terena.org**

SPONSORSHIP

Companies that want to gain exposure in, and build relationships with the European research and education networking community can sponsor TNC2014. Contact Gyöngyi Horváth: **Horvath@terena.org** or +31 20 530 4485.

All registration, sponsorship and submissions information can be found on the TNC2014 website: **tnc2014.terena.org**.

Words
Karim Mostafi, Communications Officer, TERENA

Picture
Marina Vermezović, head of the department for user services of AMRES delivering a presentation in the session Federation by Design, at TNC2013.

Photo credit:
TERENA

CAMPUS BEST PRACTICE RUNS SECURITY TRAINING

On 6 December, the GÉANT Campus Best Practice (CBP) working group successfully gave security-related training to a large group of network security experts from the East European network community. The event, held in Tbilisi, Georgia was hosted by the local NREN, GRENA.

CBP team authors gave excellent lectures during the half-day session, and talked about important topics such as securing service access with Digital Certificates, the legal aspects of WLAN Networks and provided an update on 'Centralized Cloud Firewall'.

To demonstrate the value of GÉANT services to users, the CBP team also hosted a presentation of GÉANT technologies including a mobile eduroam hotspot.

The training was organised in conjunction with the 11th CEENGINE technology workshop that was held from 4-7 December. The event co-organized by CEENET/CEENGINE and GÉANT provided a number of presentations on security technologies, policies and general matters relevant to NRENs for over 60 participants from 16 countries, with the majority representing EaP NRENs. This combining of events allowed the attendees from regional networks, campuses and NRENs to hear about security themes in a broad context. The audience was actively engaged in the CBP session and asked many questions.

As a result of the workshop, further similar training, including deeper technical hands-on training activities, has been requested by Eastern European NRENs and the next workshop has been scheduled for end of May 2014 in Sofia, hosted by the Bulgarian NREN (BREN).

Words
Nadia Sluer, TERENA

Picture
Tbilisi, Georgia

Campus Best Practice – sharing experience and expertise across the R&E community

CBP aims to address key challenges for European campus networks. The CBP team does this by organising working groups and providing an evolving and to-the-point set of best-practice documents (BPDs) for the community. Dissemination of results on a European level is a key objective.

Further information
More information about the workshop and about the Campus Best Practice activities can be found on the GÉANT CBP webpages **http://www.geant.net/Network/Campus-Best-Practice/**

FOCUS ON: BANDWIDTH ON DEMAND

MULTI-DOMAIN HIGH DEFINITION VIDEO DEMONSTRATED AT SC13

November saw GÉANT in Denver at the annual Super Computing event (now in its 25th year) with over 10,000 attendees, this event is a major showcase for the latest innovations in high performance computing and networking.

At the booth, a demonstration of the Bandwidth-on-Demand service showed High Definition TV services transmitted seamlessly across NREN networks, and the GÉANT backbone from Europe to the USA. This showed the ability to configure multi-domain Bandwidth-on-Demand services for high performance, time sensitive services. The demonstration used commercially available hardware and software to transmit HD video from Copenhagen and Dublin to Denver across the GÉANT Bandwidth on Demand service.

Words
Karl Meyer, Product Marketing and Communications Officer

Facilities such as this could be used to transmit HD video of lectures, demonstrations or performances to remote viewers without the need for expensive hardware infrastructures.

"With its recently extended global reach and multi-domain support, Bandwidth on Demand can offer a wide range of research teams cost-effective connectivity for their international projects," Tangui Coulouarn Bandwidth on Demand Task Leader, GÉANT.

NSI 2.0 OPEN FOR PUBLIC COMMENT

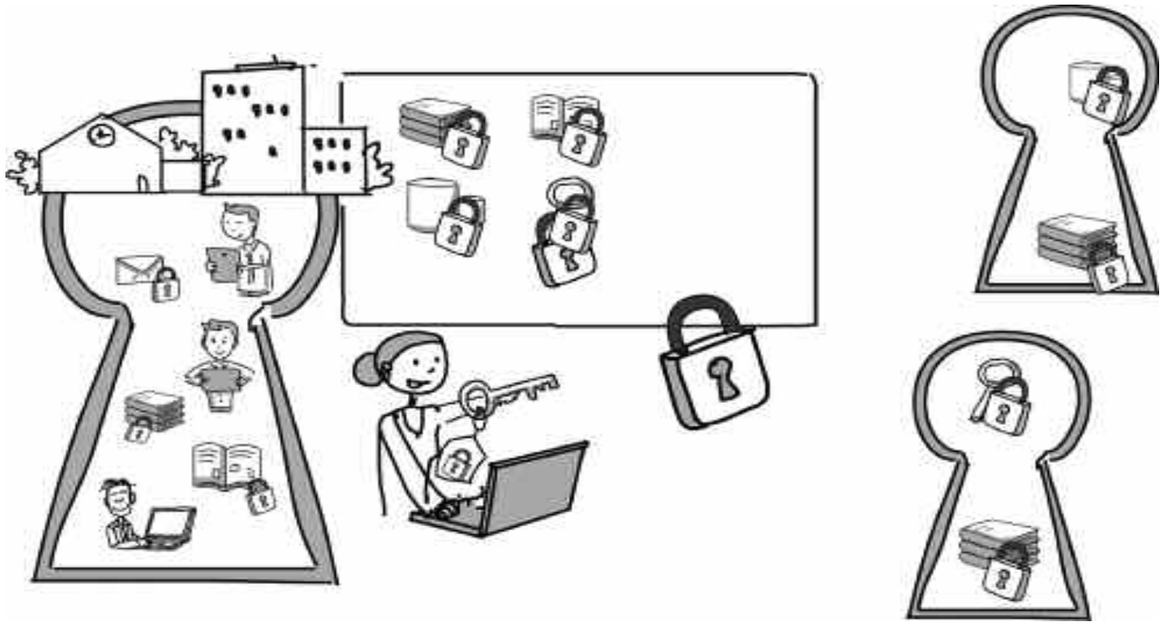
Historically, connections across networks (including services such as Bandwidth on Demand) have been reserved and provisioned in a variety of ways. The most common approach is manual provisioning – typically performed by a network engineer. In recent years, networking communities have developed tools and protocols to automate this process and to allow the user or application to participate directly in the creation process. Examples are OSCARS in the US and GLambda in Japan. These automated provisioning systems, while being developed independently by different groups have common elements, but are not fully interoperable.

The purpose of NSI is to define a standard protocol that will allow all of these systems to interoperate. NSI aims to provide a protocol and environment that supports the management of connections that transit multiple networks operated by different providers. The NSI is a web-service based API that operates to deliver multi-domain circuits. NSI is made up of a suite of services, these include the Connection Service, Topology Service and the Discovery Service.

The NSI working group with the Open Grid Forum has released the NSI Connection Service v2.0 for public comment. This is available at **http://redmine.ogf.org/projects/editor-pubcom/boards/18**. The deadline for comments is 15th April and comments are welcome from across the community.

NEW BOD WEBSITE

To help promote the use of Bandwidth on Demand throughout the GÉANT community a new website has been launched at **http://bod.geant.net**. This provides users with a much improved navigation and a fresher look and feel.



EDUGAIN GROWING IN VALUE AS MORE SERVICES INTER-FEDERATE

The number of online services and amount of content made available to students and researchers internationally through the global GÉANT eduGAIN inter-federation service has grown, with 50% more federations joining or participating in the past year. The services available through eduGAIN range from academic journals and research tools to collaborative teaching environments, adding value to research and education across Europe and the world.

The DARIAH (Digital Research Infrastructure for the Arts and Humanities) project aims to enhance and support digitally-enabled research and teaching across the humanities and arts. An effort is underway to ensure that eduGAIN is the platform for connecting all services within DARIAH, as Peter Gietz of the project's e-infrastructure team explains: "We see eduGAIN as the best approach to achieve a much-needed Europe-wide Authentication and Authorisation Infrastructure within DARIAH. eduGAIN might need some time to fulfil all requirements of research infrastructures, but I am very confident that this will be reached in the framework of a co-laboratory effort."

Online meeting services are also growing as a result of inter-federation through eduGAIN. The e-meeting service offered by SUNET, the Swedish NREN, has work ongoing to get its Adobe Connect Pro tool connected through eduGAIN. These online 'rooms' will benefit participants within the GÉANT project itself, and will be available in conjunction with the eduCONF service, which supports and facilitates the pan-European adoption of high-quality videoconferencing. Besides holding meetings, project participants can join in weekly GÉANT Showcase webinars that help to keep them informed about the wide variety of activities and developments within the project.

TERENA, the association of European NRENs, is also using eduGAIN for all its federated member services. These allow the sending of large files and access to tools for conference and event planning, for community data gathering, for certification and for sharing information in a community wiki.

While the eduGAIN Task Leader, Brook Schofield (TERENA) is pleased at the growing number of services connected through eduGAIN, he is aware that much remains to be done to realise the service's full potential: "There is still a much greater number of online services that are not connected, but the federation partners, eduGAIN team and the enabling-users task within the GÉANT project will continue to work together to get them onboard and provide the greatest possible value to students and researchers around the world."

For more information, see:
TERENA: **www.terena.org**
DARIAH: **http://www.dariah.eu/**
SUNET e-meetings:
http://www.sunet.se/English/Home/Services/E-meetings.html

Words
Laura Durnford, Senior Communications Officer, TERENA

Picture
The eduGAIN video shows the benefits of participating, including access for users to a wider range of services as more federations inter-federate.
Youtube.com/GEANTtv

SUCCESSFUL EDUPERT TRAINING AT EGI

DEMONSTRATING BENEFITS OF TROUBLE-SHOOTING PLATFORM TO ALL NETWORK USERS

In September, GÉANT organised a well-received eduPERT training workshop at the European Grid Infrastructure (EGI) Technical Forum, to provide users the support needed to improve and troubleshoot end-to-end network performance themselves. This is the first time eduPERT training has been organised outside of the National Research and Education Networks (NRENs) bringing the benefits to a wider community.

With scientists and researchers more and more reliant on high-speed networks to share and store data across campuses and even continents, poor network performance can drastically impinge output and drain resources.

MOST NETWORKING ISSUES HAPPEN IN THE 'LAST MILE'

Nearly all degradations in network performance can be narrowed down to the end of chain, occurring within the university or laboratory and often on the laptop or computer itself.

eduPERT is part of GÉANT's commitment to helping network users get the best performance from their connections. By providing a federated PERT (Performance Enhancement and Response Team) and a forum to share knowledge, skills, tools and best practice to solve end-to-end performance issues, this approach is helping to grow the PERT community.

Alessandra Scicchitano, eduPERT Task Leader, said:

"We recently showed how one small configuration on a user's laptop increased network speed by 20%. This type of knowledge sharing goes a long way to dealing with everyday performance issues for scientists and researchers.

By joining the eduPERT community researchers improve their end to end performance experience and their ability to monitor and troubleshoot the majority of issues themselves. As a federated community, every piece of knowledge is pooled, incrementally improving the GÉANT service offering as more people join."

Words
Alessandra Scicchitano, eduPERT Task Leader

EDUPERT IS AN OPEN COMMUNITY

Anyone can join eduPERT to share and grow knowledge of the networking environment. Monthly phone calls and summer workshops are available to universities, laboratories and international projects, who are encouraged to sign up.

"I found the eduPERT training pertinent and useful. In the future, it would be interesting to have a two-level training session: a 'beginner' level and a more 'advanced' level. The latter could address further issues on the pure network layer, like switching and routing technologies and performance, MTU settings etc."

Gianfracco Sciacca, EGI resource centre manager at AEC-LHEP, University of Bern

"The eduPERT training given at EGI Technical Forum in Madrid was useful and thorough. It covered different topics from how to tune the end host to how to measure performance of the network.

I learned different things during the training that I can easily apply to my daily job and that can help me to reach better performance."

Miguel Gila, HPC System Engineer, CSCS Swiss National Supercomputing Center

Find out more about eduPERT
http://www.geant.net/eduPERT

GÉANT MOVING CLOSER TO FEDERATED IDENTITIES ACROSS ALL SERVICES

The GÉANT community relies heavily on SharePoint 2013 as an intranet platform to share documents, create meetings and access important project information. With almost 300 project participants, collaborating across Europe, it is a critical resource.

More and more GÉANT participants use federated identities provided by their home institution to access services. Thanks to eduGAIN, these federated identities could also be used to access GÉANT services. GÉANT aims to federate SharePoint, so users can benefit from improved security and end-user experience using eduGAIN.

eduGAIN is the GÉANT interfederation service simplifying access to content, services and resources for the global research and education community. It aims to enable the trustworthy exchange of information related to identity, authentication and authorisation between the GÉANT Partners' federations.

Teams across the project are currently working to integrate SharePoint with eduGAIN as a service provider and to decentralise user account management, while managing access control centrally.

Eventually the goal is that GÉANT participants will have only one set of credentials for all federated services. For most it will be the set of credential issued and managed by their home institution. This will not only make access easier and more consistent, but also minimize the set of log in details to remember and it will reduce the management overhead of GÉANT IT greatly.

Federating SharePoint will allow users to benefit from single sign-on (SSO) which will significantly enhance user experience and encourage more users to actively use the GÉANT Intranet as a collaboration platform.

GÉANT is working to develop this service first across the intranet and eventually as a template across all other GÉANT services requiring AAI (Authentication and Authorisation Infrastructure). The project is progressing well and is likely to go into full production in May. Watch this space for more information in our April issue.

Words
Mandeep Saini, Senior Software Engineer, DANTE

GÉANT VPN SERVICE OFFERS RESEARCHERS NEW OPPORTUNITIES

IP networking has provided the R&E world an effective, worldwide standard for communication since its standardisation in 1982. The ubiquitous nature of TCP/IP has meant that virtually anyone, anywhere can communicate and collaborate without the need for separate network connections or multiple pieces of software. The NRENs and GÉANT support this collaboration through their national and international IP networks. These IP services have been designed to provide general purpose transit services between participating NRENs and other approved research and education partners and providers.

Many research projects require the additional security and reassurance of a Virtual Private Network to ensure data services are isolated from general IP traffic. For teams requiring support for many-to-many site connectivity a Layer 3 VPN (L3VPN) offers the solution.

By creating a virtual IP network, all sites on the VPN can communicate flexibly without the need to arrange separate networks whilst benefiting from the privacy and security of a private infrastructure.

GÉANT and the NRENs have worked together to provide a uniquely flexible and powerful service. The service allocates unique VLAN identifiers to each L3VPN to ensure data isolation across the GÉANT network giving assured performance and security.

L3VPNs are ideal for many-to-many (peer to peer) or one-to-many (central site to satellite) environments where each site can be allocated bandwidth according to its own requirements. Each site can support bandwidths from 155Mbps to 100Gbps (subject to availability).

"GÉANT L3VPN offers the reliability and flexibility of the GÉANT IP service combined with the additional privacy of a Virtual Private Network (VPN). Research projects, academic institutions and organisations needing an additional level of security but without renouncing to the full 100Gbps capacity GÉANT can offer, can now rely on a VPN service which is designed for them", Domenico Vicinanza, GÉANT Network Services Product Manager.

With the launch of the L3VPN service GÉANT and its partners have provided research projects with a valuable new networking tool to support international collaboration across the community.

For more details of the L3VPN service can be found at **http://www.geant.net/Services/ConnectivityServices/**

Words
Karl Meyer, Product Marketing and Communications Officer, DANTE

GÉANT AND TERENA NETWORK ARCHITECT ACTIVITIES ALIGN

GÉANT activities in the area of network architecture design, deployment and operations were well represented during recent back-to-back TERENA events: the Network Architecture workshop and meeting of TF-NOC (Task Force on Network Operations Centres), that were held in Prague in November, provided a valuable forum for knowledge transfer between GÉANT Service Activities (SA) and Joint Research Activities (JRA) with community members who are not directly involved in the project.

Workshop attendees heard the latest updates on the GÉANT core backbone services and the new Multi-Domain Virtual Private Network service pilot. Engineers from DANTE talked about GÉANT IP and GÉANT Plus network convergence issues and the consequences for network operations performed by the GÉANT Operations Centre at DANTE. GÉANT activity leaders from NORDUnet presented the latest details about the Testbed as a Service activity and delved into the progress being made with defining the network architectures for Horizon 2020. In return, several NRENs gave updates on their national network architecture developments and deployments.

TERENA workshops and task forces are generally open to anyone. At the Prague events, participants included staff from regional networks, campuses, commercial organisations, NRENs and the user community. Network researchers from the University of Perugia, Italy, presented the Advanced Networking for EU Genomic Research (ARES) project, which is one of the GÉANT Open Call winners and will experiment with special Content Delivery Network (CDN) architectures and use the Testbed as a Service production facility. Attendees appreciated this end-user perspective at the workshop.

GÉANT AND THE NRENS - REGIONAL NETWORKS AND CAMPUS IT

At the TF-NOC meeting, which followed the workshop, DANTE presented the operational changes and enhancements resulting from recent migration of the GÉANT network's optical platform. Following a recent reorganisation of DANTE Operations and the resulting transformation of the GÉANT Access Port Managers group into a new GÉANT Service and Technology Forum, a commitment was made to ensure that DANTE and the GÉANT Operations Centre are represented at all future TF-NOC meetings. The plan is to co-locate the next TF-NOC and GÉANT Service and Technology Forum meetings in Cambridge, UK.

Words
Peter Szegedi, TERENA

Picture
The TF-NOC workshop was held in Prague

ADDITIONAL INFORMATION:

TERENA Network Architects Workshops:
http://www.terena.org/activities/netarch

GÉANT services:
http://www.GÉANT.net/Services

TERENA TF-NOC:
http://www.terena.org/tf-noc

GÉANT Access Port Manager Information (restricted):
https://intranet.GÉANT.net/SA1/APM

BUILDING THE WORLD'S FASTEST NETWORK FOR ONE WEEK ONLY

Q&A CORMAC Ó CIANÁIN

SENIOR NETWORK ENGINEER, HEANET

Every year for the duration of Supercomputing, the world's biggest conference for the high performance computing (HPC) community, SCinet volunteers build the world's most unique, very high capacity network to support revolutionary applications and experiments that are a hallmark of the conference.

During its short seven-day lifespan, SCinet becomes the fastest computer network, linking research and commercial networks around the globe, and providing the bandwidth required to demonstrate the advanced computing resources at exhibitors' home institutions and elsewhere.

CONNECT caught up with Cormac Ó Cianáin, Senior Network Engineer with Network Operations at HEAnet, one of the organisations involved in the remarkable production of the SCinet network.

FIRST OF ALL, HOW IS YOUR ROLE LINKED TO GÉANT?

I'm currently working as an Access Port Manager (APM) for Ireland within GÉANT and as a Senior Network Engineer with Network Operations within HEAnet. HEAnet is one of 41 National Research and Education Network (NREN) partners in the GÉANT project, and we specifically specialise in providing internet services to research and education organisations throughout Ireland.

HOW MANY PEOPLE ARE INVOLVED IN SETTING UP SCINET?

SCinet is created by a group of roughly 130 volunteer engineers, who setup, maintain, monitor and tear down this network. Comprised mainly of researchers, developers and engineers from industry, government agencies and academia all over the world, it takes over a year of planning to execute, three weeks of high-intensity installation to setup and a week to run.

Once the conference finishes, it takes just 48 hours to tear it all down again. As you can imagine, with the amount of effort required, preparations for SC14 to be hosted in New Orleans are already well under way.

HOW BIG IS SCINET AND WHAT IS IT USED FOR?

It is considered to be 'the world's fastest network', but I'll let SC13's stats do the talking!

SCinet:

- supported the needs of 10,000+ attendees
- required $21 Million in donated equipment
- delivered 884 Gigabits of WAN capacity
- utilised 94 miles of Local Fibre
- provided 200+ Wireless access points
- reached 2.391 million external IPv4 addresses and 13,790 unique IPv6 addresses

Every year these stats grow, showing that SCinet is always delivering the fastest state-of-the-art network possible.

WHAT WAS THE MAXIMUM OBSERVED TRAFFIC DURING THE CONFERENCE?

The peaks were approximately 211 Gbps inbound, and 215 Gbps outbound for all links combined. These were achieved during periods of demonstration activity by conference participants.

HOW DID HEANET GET INVOLVED?

HEAnet is always keen to engage in knowledge sharing. The Supercomputing conference provides a unique opportunity to work with many different vendors, contributors, researchers and fellow NREN engineers. It's very beneficial meeting these people in a 1:1 capacity so both sides can ascertain each other's requirements and points of view. In many cases, we've come across the same troublesome issues yet have resolved them differently.

Picture
The SCinet team

Photo credit
Courtesy of ACM

HAVE YOU DONE THIS BEFORE?

Yes, this was my forth year as a member of SCinet. Through GÉANT, we began supporting SCinet back in 2010 and have followed it from New Orleans, to Seattle, followed by Salt Lake City and most recently Denver for SC13.

WHAT WERE THE BIGGEST CHALLENGES IN THIS PROJECT?

As you can imagine, the SCinet network is extremely complex, utilising equipment and components from numerous vendors. The interoperability of the equipment is always a concern; making everything work seamlessly is a challenge. Further complicating the issue is the fact that many of the components loaned to SCinet are engineering prototypes or alpha/beta-level components.

Yet SCinet is committed to operating the network with the stability of a production-level network—a feat that is very difficult given the compressed time frame for operation of the network. The ability for SC13 attendees to utilise a state-of-the-art network with next generation components to demonstrate their research activities is part of the allure of the conference.

WHAT DID YOU LEARN FROM THE EXPERIENCE?

I was part of the Measurement team within SCinet. Using a series of measurement tools: Cacti, ESX SNMP, Ganglia, Nagios, perfSONAR , NFsen and INMON, we were able to graph and monitor the network.

Working closely with other SCinet teams of Routing, Security, IT Services, Wireless and WAN transports, we were able to troubleshoot and resolve connectivity issues for exhibitors and attendees alike.

Identifying connectivity issues and potential bottle necks is a challenging task in itself. Doing so within a tight time frame across many organisations and platforms using various languages and methodologies requires dedicated and highly motivated individuals. It does however provide like-minded engineers the perfect environment to exchange expertise in their areas with others and to learn many lessons from the rapid implementation of such a large network.

WILL YOU BE ATTENDING NEXT YEAR?

Sadly not, after four manic yet enjoyable years, work for our own HEAnet conference and preparation for TNC 2014 will take precedence. It has been a great experience though.

For more information about SCinet in 2014 visit:
http://sc14.supercomputing.org/scinet-contributors

For more information about HEAnet visit
http://www.heanet.ie/

ARE YOU GOING TO SC14?

Following the success of last year, GÉANT will once again be exhibiting the power of its 500Gbps network at Supercomputing. With demonstrations from some of the world-class research organisations working with GÉANT, visitors can learn first-hand how the project supports European and worldwide science and research.

eduPERT

EDUPERT & ESNET PRESENT:

AN OVERVIEW IN EMERGING (AND NOT) NETWORKING TECHNOLOGIES 18-19 MAY 2014

The eduPERT team will be running its annual Performance U! Workshop in Dublin on the 18-19 May running in conjunction with the annual TNC conference.

This event aims at training performance experts, providing validated performance resources and face to face training. Sunday will be the "Performance U!" annual workshop where the community can learn about performance implications of new tools and new technologies.

The school will cover technical aspects like TCP tuning and measurement tools giving this year a much more practical hands-on approach. On Sunday afternoon before the conclusion of the day the annual meeting of eduPERT will be held.

On Monday, engineers from The Energy Sciences Network (ESnet) will present the Science DMZ network design pattern. Materials will include an overview of network architecture, a discussion on the practical aspects of network security for scientific use cases, a review of the perfSONAR monitoring framework, and finally a discussion on bulk data transfer improvements made possible through advanced software and hardware.

For more information on the performance U! workshop, how to register and how to become a member of eduPERT, visit **eduPERT.geant.net**.

eduPERT is the federated PERT that combines the independent PERTs across Europe to aid them in their network investigations and enables network users to get the best performance from their connections and their systems.

eduPERT enables collaboration and knowledge transfer between the PERTs and helps shortening the time needed to troubleshoot and fix end to end issues.
This translates for the customers in better performance of their network and applications and less of their time invested in understanding and solving technical problems.

As an open and actively coordinated forum to share knowledge, skills, tools and best practice, eduPERT provides multidisciplinary knowledge and support in solving end to end performance issues. Its reach extends towards the end user and the end point and includes new technologies such as: high-speed connectivity, diverse traffic profiles, big data as well as new end point environments like cloud or data centre.

MEETING THE CHALLENGES OF THE DATA DELUGE

– A WORKSHOP ON FUTURE NETWORK ARCHITECTURES

The migration to the latest transmission and switching technology has dramatically increased capacity across the network but is still based on the same basic network architecture that has existed since the start of packet networking. As the demands and capabilities of R&E networking accelerate it is essential that NRENs work together to share knowledge and experience and help the network infrastructures meet the demands of the future.

With this in mind, on 21-22 November 2013 in Copenhagen the GÉANT research activity on Network Architectures (JRA1) held a workshop with the purpose of sharing ideas, views, concerns, different approaches and solutions for the architecture challenges of future research networks. During the two day workshop the participants used the opportunity to discuss the best solutions for shaping future network architecture and bringing these scenarios to the GÉANT community. The workshop was also streamed live to enable a wider audience to take part.

The interesting scope of the workshop attracted more than 30 participants with fourteen NRENs represented and attendees from Ciena and Telefonica also joining in the workshop discussions to share their views from an industry perspective. In addition representatives from four Open Call projects were also present – from iMinds (IRINA), CNIT (REACTION), DTU (MOMoT). Their presentations triggered high interest and heated discussions. Many workshop participants found it very useful to get in contact with associated Open Calls presenters and to start discussing future collaboration.

The workshop started with a short overview and updates from the three different research tasks of the Network Architectures Activity (Future Network Architectures, Network Architectures for Cloud Services and High Speed Mobile Architectures) and then from the Open Call participants who will be using GÉANT to support their research into advanced networking technologies.

One of the aims of the workshop was to compare approaches of NRENs and those of commercial operators. This sharing of different strategies inspired discussion, development and will hopefully help in creating better scenarios across the NREN community. Following this workshop the JRA1 will be using the results and discussions to help build whitepaper recommendations on future network architectures to help support GÉANT and the NRENs

A major benefit of the workshop was the ability for the participants to meet, share and learn from each other. This knowledge and skill sharing is key to successful and effective collaboration in GÉANT and beyond.

SUMMER SCHOOL FOR GÉANT SOFTWARE DEVELOPERS

Words
(left to right)
Pawel Kedziora, PSNC, Nemanja Zutic, AMRES, and Nikolaos Kanakis, GRNET

Picture
Summer school in Poznan

Advanced software is central to delivering GÉANT's innovative, high quality services, meaning there are a growing number of developers working within the project, using leading edge tools and techniques in their work. However with developers split between different teams and countries, connecting them is important to driving the project forward.

Introduction

Bringing together developers from across Europe to share best practice, network and learn new skills is the mission of the GÉANT Summer School for Developers (SDS). Now in its fourth year, over 20 people attended the latest Summer School, held 18-22 November at the Poznan Supercomputing and Networking Centre, Poland.

The SDS centered on software development best practices drawn from agile methodologies, and the main topics were Extreme Programming, Code Refactoring and agile software development practices, with the focus on testing and pair programming throughout code retreat sessions.

CONNECT caught up with Nikolaos Kanakis of GRNET and Nemanja Zutic of AMRES to see what they thought of this popular event.

Why did you decide to attend the school for developers?

NK: I decided to attend SDS because of the positive feedback I got from colleagues who had participated in past events. Furthermore if was a very good opportunity to meet and get familiar with the topics of the SDS which I found to be really interesting and useful.
NZ: I had positive feedback about previous schools from my colleague (who had participated in two previous schools) and also the topic of code refactoring was something that I was interested in since I had a task to refactor a fairly large amount of legacy code for a project I work on.

Was this your first GÉANT school

NK: Yes it was the first time and I wish to have the opportunity to attend future SDS events.
NZ: Yes, this was my first time, but hopefully not the last!

Did you learn new skills and techniques?

NK: I am certain that the SDS attendance supplied me with new techniques and development skills, which enhanced the way I cope with my job requirements. As a result, I now feel that I can develop more robust and efficient code.
NZ: Yes, I have learned new techniques on writing automated tests and also how to use shortcuts within the IDE to refactor code more quickly and efficiently. These are techniques that will surely help me in my role.

Did you learn more about the software and infrastructure used in the GÉANT project?

NK: During the school I had the chance to use and get familiar with several development tools that the GN3plus infrastructure provides. Those tools are very helpful for the development of efficient and high quality code.
NZ: I was aware of some tools and infrastructure available to GÉANT developers, but during the school I also got a chance to use some I didn't encounter before (like Sonar tool for static code analysis) and I think that they are very helpful and useful for the development process.

Did going along benefit your day to day job?

NK: The knowledge I got from the SDS had significant effects in the way I develop code, as I constantly use several development approaches in my tasks. More specifically, the SDS allowed me to broaden my knowledge on test driven development and enhanced my skills on handling legacy code, a fact that made me a better developer from several perspectives.
NZ: It most certainly did. After attending the school I had a task to refactor a legacy service and I found techniques I acquired to be very useful. I did the same things that I used to before I attended the school, but now more quickly and with less chance of errors thanks to the things I learned.

What area/session did you find most useful?

NK: In my opinion, the session in which we had to apply the theoretical background of other sessions to coding tasks, was the most useful part of the school.
NZ: I would say that the second day was most useful. We were required to apply techniques we were shown earlier to refactor small parts of legacy code. These were all short tasks (no more than 1 hour) and focused on the specific refactoring techniques.

Did you enjoy the whole experience?

NK: Overall, it was a very interesting experience for me, and a very good opportunity to work with other GÉANT developers.
NZ: Yes! The whole experience was a very pleasant one for me. I had a chance to meet other developers, who use the very same, or very different programming languages, tools and techniques as I do so we had a chance to approach the subject of the tasks from different perspectives.

Will you attend further editions of the event?

NK: Certainly, I would like to participate again in future SDS events.
NZ: If I have the chance I would most certainly like to attend future editions of the event.

Would you recommend this course to others?

NK: I fully recommend attending SDS to other developers, since it provides really useful developing experiences.
NZ: Yes I would. I think it is useful for every developer to learn new techniques and processes. It is also a welcome break from everyday work and a chance to solve different problems than those that our projects put in front of us.

PIONEERING COLLABORATION LEADS TO IMPROVED INFRASTRUCTURE

The Portuguese and Spanish National Research and Education Networks, RCTS and RedIRIS, recently signed a memorandum of understanding with GÉANT – the Pan-European advanced research communications network - enabling the GÉANT connection between Spain and Portugal to be improved by using both countries' fibre optic infrastructures.

Based on this infrastructural synergy, GÉANT now benefits from a new, simple and cost-effective service supplied, in cooperation, by FCT-FCCN (Lisbon-Badajoz) and Red.es (Badajoz-Madrid), the Public Corporate Entity responsible for the operational management of RedIRIS. This service is based on a 10Gbps lambda with WAN-PHY encapsulation, used to interconnect GÉANT's PoPs in Lisbon and Madrid, whose locations were maintained.

This memorandum of understanding, signed by FCT-FCCN, Red.es and the GÉANT consortium has several advantages.

On one hand, cost savings have been obtained, as this new connection replaces a commercial third party connection supplied at a significantly higher price to the GÉANT consortium.

On the other hand, the scalable service provided by FCT-FCCN and Red.es will make it simpler and cheaper to increase the capacity on this route, if required.

This service was made possible by the direct interconnection between both networks (RCTS and RedIRIS-NOVA). This was originally implemented in the east-west axis in May 2009 and the north-south axis in June 2012. This direct connection was already bringing benefits to both Portuguese and Spanish researchers and academics, in particular those working on Grid issues. 489 affiliated institutions are currently part of RedIRIS, while about 70 organizations are connected to RCTS. Direct interconnections between the two networks were originally installed with IPv4 and IPv6 enabled.

Both national networks have transmission equipment from different manufacturers; however, this has not affected the deployment and operation of services. There are also two different and independent monitoring systems, but the coordination between both supervisory teams is excellent.

The jointly provided service is in use to interconnect Lisbon and Madrid from the beginning of September 2013.

FCT-FCCN and Red.es are very pleased with this cooperation, and both emphasize the pioneering nature of the integration of a cross-border connection in the backbone of GÉANT, one of the most advanced data networks in the world.

For more information, see:
RedIRIS: **www.rediris.es**
CT-FCCN: **www.fccn.pt**

Words
Carlos Friaças, Network Engineer, FCCN and Cristina Lorenzo, RedIRIS PR Manager, Red.es

REDIRIS: 25 YEARS SUPPORTING RESEARCH

RedIRIS 25th Anniversary Commemorative Event:

At the 25th Anniversary commemorative event, His Royal Highness the Prince of Asturias, Felipe de Borbón y Grecia, gave a speech emphasising the important work of RedIRIS and its usefulness for Spanish researchers.

The Minister of Industry, Energy and Tourism, José Manuel Soria, who is responsible, through Red.es, for the operational management of RedIRIS also emphasised the decisive way it has helped to promote the Internet in Spain.

Carmen Vela, the Secretary of State for R&D&i at the Ministry of the Economy and Competitiveness, which owns and funds RedIRIS, explained how the network is key for improving the competitiveness and productivity of science and technology in Spain.
After the event, the team enjoyed an informal discussion with the Prince of Asturias.

RedIRIS 25th Anniversary Technology Exhibition:

From 22 to 25 October, the National Museum of Natural Sciences (**MNCN-CSIC**) held the RedIRIS 25th Anniversary Technology Exhibition, to give those attending the **RedIRIS Technical Conference** (RedIRIS's main annual event, held in parallel with this initiative), the opportunity to view equipment from before the time when RedIRIS existed as a "network" (up until 1988), right through to the present day.

The exhibition was divided into subject areas: Prior to RedIRIS as a "network"; The beginning of RedIRIS; The arrival of the Internet; RedIRIS on ATM; RedIRIS Gigabit; and RedIRIS-NOVA.

Of particular interest to the 300 attendees were:

- The varied Net equipment, showing the evolution from X.25 switches to the first CISCO router models used for an IP backbone still encapsulating IP traffic in X.25 lines. This included one of the M20 routers used in the **Internet2 Land Speed Record** in October 2002 with **ARNES** and **GÉANT**.
- The slide rule, used by researchers before the existence of computers and calculators to carry out complex mathematical calculations
- Various microcomputers, such as the Sinclair Spectrum 48k

Information on the equipment at the show and further information can be found here:
http://expo25.rediris.es/omeka/exhibits/show/exposicion

Pictures
(Top to bottom)
The RedIRIS team

His Royal Highness the Prince of Asturias, Felipe de Borbón y Grecia

PRACE EDUCATES TOMORROW'S RESEARCHERS

PRACE´s Dare to Think the Impossible outreach activity with online campaign material illustrates how PRACE high-performance computing (HPC - also known as supercomputing) resources are applied in research and innovation and just how much HPC-aided research impacts our lives. The campaign materials introduce young students to HPC in their own words, engage them in an interactive demonstration of what supercomputing can do, and invite them to explore real life examples of exciting research carried out today by top scientists with the help of PRACE supercomputers.

PRACE is educating tomorrow's researchers and potential users of PRACE about the power of supercomputing with the Dare to think the Impossible campaign. The campaign focuses on students, ages 15 to 19 and secondary school teachers as well as the general public. The campaign encompasses a variety of media, including an informational website (the **Dare to Think the Impossible** portal), social media (**Facebook**), brochures, **videos on YouTube**, and an astronomy-themed online video game for **iPhones and iPads** and for **Android devices**. The content is designed and written in the words of young people, with bold images that point to exciting discoveries and real-life stories from cutting-edge researchers on the forefront of scientific discovery inviting them to explore the world of supercomputing and its applications. Campaign material can be used as a part of science studies during lessons. Several PRACE member countries are developing HPC curriculum modules for local high schools, with the pilot campaign content at the core. The results have been encouraging.

The material and rich media engage, challenge and invite students to imagine, dream and learn more about what part they can play in future inventions and developments. Hopefully it will encourage them to study science even further. The free **Shooting Stars** video game was developed as a cross-platform (web, iOS, Android) application. It simulates the star systems with challenging orbits and increasingly difficult tasks on each level, giving hints of supercomputer simulation in an entertaining format.

Today's high-school students are tomorrow's researchers and inventors. We invite you all to challenge them to Dare to Think the Impossible; to defy convention and recognize just how far their imaginations can take them.

All materials are available on the PRACE website:
http://www.prace-ri.eu/dttti

For more information, see:
PRACE - **www.prace-ri.eu**

Words
Tiina Leiponen, Communications Coordinator, CSC – IT Center for Science

Pictures
(Top to bottom) Local outreach event in Finland at Heureka

The Finnish Science Centre in September 2013

Photo credit
Photos by: Paula Havaste, Heureka ,Tiina Leiponen, CSC, pic CSC, 13, 16 copyright Timo Suvanto/Heureka

PRACE SPREADS ITS WINGS – PROMISING ACTIVITIES FOR 2014

PRACEdays14 | HPC for Innovation: when Science meets Industry

In 2014, PRACE will organise its first **Scientific and Industrial Conference** – the first edition of the PRACE days - under the motto **HPC for Innovation – when Science meets Industry**. The conference combines the previously separate PRACE Scientific Conferences and PRACE Industrial Seminars and will bring together experts from academia and industry who will present their advancements in HPC-supported science and engineering.

The PRACE days will be held in **Barcelona** from **Tuesday 20 to Thursday 22 May 2014**.
More information and the **Call for Contributions** can be found here:
http://www.prace-ri.eu/pracedays14

Pre-Commercial Procurement: Whole-System Design for Energy Efficient HPC

On 20 November 2013 a multi-country and multi-partner joint effort, was launched by a consortium composed of several partners of PRACE (CINECA (Italy); CSC (Finland); EPCC (UK); JSC (Germany); and GENCI (France)).

Tenderers are invited to bid for the provision of research and development services that seek solutions for Whole-System Design for Energy Efficient HPC. PRACE has a strong interest in improving energy efficiency of computing systems and reducing their environmental impact.

Therefore, PRACE will be involved
as an advisory body in a Pre-Commercial Procurement (PCP) pilot executed in the context of PRACE's 3rd Implementation Project (PRACE-3IP). More information can be found here:
http://www.prace-ri.eu/art573

10 innovative European SMEs to pilot first PRACE SHAPE

In June 2013, PRACE launched its first **SHAPE** (SME HPC Adoption Programme in Europe) open Call for Applications to all European SMEs with a business project that could be implemented using HPC.

The call had a brilliant response with replies from 14 SMEs from 7 different Countries (Bulgaria, France, Germany, Ireland, Italy, Spain and the UK) and spanning across various industrial domains.

The PRACE SHAPE experts will work with the 10 selected SMEs until May 2014 to develop their solutions, providing them with knowledge that will allow them to make an informed decision on the selected HPC solutions and plan future actions, also considering the support of independent service providers at a later stage. More information on these first 10 pilot projects can be found here: **http://www.prace-ri.eu/SHAPE-Pilot-Selection**

For more information, see:
http://www.prace-ri.eu/

Words
Marjolein Oorsprong, PRACE Communications Officer

SOCIAL MEDIA FOR NATIONAL RESEARCH AND EDUCATION NETWORKS AND NGOS

arnes

Words
Domen Božeglav, Senior Consultant, ARNES

Social Media are becoming increasingly present not just in our daily lives but in our work too, so whatever our personal feelings it is no longer possible to ignore them. On the other hand jumping into Social Media without knowing what you want to achieve is as pointless as ignoring them altogether. In collaboration with teams from NRENs, TERENA and DANTE, we have created a "Social Media Jumpstart Pack", a set of ideas to help you jumpstart your Social Media presence. Hopefully these ideas will help you decide whether it is worth spending your resources on Social Media – and provide some clear pointers on how to set about it.

The first question that you have to answer sincerely is whether you really need Social Media at all. The fact is,

regardless of your strategy and approach, it will take time. So while thinking about what social media you would like to use, focus on your expectations and decide what constitutes success for you. Do you need to deploy a Facebook and LinkedIn page, or would Twitter meet all your requirements? What will be the ROI for your efforts? Don't forget to get management "buy-in" as soon as you make the decision to expand your communication channels via Social Media. In the deployment phase you honestly don't need to be too innovative, unless you really have a surplus of time and money. Just as Social Media applications use concepts that are much older than computers, you can use the step-by-step tips and tricks for Facebook, Twitter and other applications collected in the Jumpstart pack. Once your presence is deployed, don't forget to engage your co-workers, since they can be a vital part of your social channels. Regularly monitor your social influence and act accordingly. And most importantly, when the figures start speaking for you, don't forget to report back to management.

Whether you are in the early stages of expanding your current communication channels to Social Media or a seasoned Social Media content provider, we hope the Jumpstart pack will provide you with the help and know-how you are looking for.

The Social Media Jumpstart Pack is available free for NRENs at: **https://confluence.terena.org/display/social/NREN+Social+Media+Jumpstart+pack** (login required).

EGI OFFERS NEW RESOURCE ALLOCATION POOL FOR RESEARCHERS

December 2013 saw the establishment of a new way to access the resources offered by the European Grid Infrastructure (EGI) and its partners. The Resource Allocation Pool offers 5,000 job slots and 170 TB of storage to any researchers that want access to EGI storage and computing services. You just need to ask.

EGI is a pan-European federation of national computing facilities supporting cutting-edge research by opening up their resources to European researchers and their international collaborators. Over 22,000 researchers across a diverse range of research groups and disciplines are already using the grid to do their work. The Resource Allocation Pool aims to increase this number, by having a simple application process. Researchers will be supported in the process of getting up and running through the EGI user support services.

"This is an opportunity for scientists to try out what we have to offer them," explains Peter Solagna, Operations Manager at EGI.eu. "It gives new and existing user communities simplified access to the resources needed to perform their work, allowing pilot projects or the ability to reserve resources for specific activities. We are offering exclusive access to a limited set of resources, or they can share a larger portion with others."

The Resource Allocation Pool uses the facilities of 5 countries within EGI (Belarus, Croatia, Greece, Poland and Turkey) as well as the International Desktop Grid Federation. To make the process as simple as possible, applicants for the Resource Allocation Pool just need to provide information about the user community or project that they represent, the use case that they want to run, and an assessment

of the resources needed. They will then be contacted by the EGI Operations Team to discuss the proposal and provide technical assistance and expertise in getting them up and running on the resources.

During this initial phase applications are being processed on a 'first come, first served' basis. For more information and details on how to apply, please visit **http://go.egi.eu/RAP_News**

Words
Neasan O'Neill, NGI Communications Coordinator

COMMUNITY NEWS

15TH CARNET USERS CONFERENCE CUC 2013

Words
Goran Skvarc, CARNet

The 15th CARNet Users Conference CUC 2013, held under the title "Reach for Knowledge!“ from 20-22 November 2013 at Hotel Antunović in Zagreb, drew to its close. The Conference was organised by the Croatian Academic and Research Network – CARNet under the auspices of the President of the Republic of Croatia, Ivo Josipović, and the Ministry of Science, Education and Sports, as well as with the support of the City of Zagreb.

The notion that knowledge is indeed reachable was substantiated with a programme comprising 4 keynote lectures, 11 workshops, more than 30 peer-reviewed papers, a round table on the educational system computerisation process, along with several presentations by CARNet and its partners.

The main programme of the Conference was divided into six topics: Mobile Technology and Application, Digital Competences, Trends in Instruction, Research and Information Technology, Content Creation and Sharing, and Educational Institutions in the New Environment. A special programme topic was sys.trek, designed for system engineers working at CARNet member institutions, with 16 presentations and 3 workshops this year.

Continuing the well-established tradition, this year's CUC again provided its participants with a unique chance of seeing some of the most renowned experts in the field of information and communications technology and education. There were four invited lecturers who participated in the Conference, two of which deserve a special mention. Mr Bum-Coo Cho, Senior Vice President of Mobile Communications at Samsung, talked about the ways of inspiring new learning approaches. In addition, he presented the experiences derived from the Samsung Company's joint venture with CARNet on the Future Classroom project. The other notable invited lecturer is Prof. Ivica Puljak, PhD, from the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture in Split, who explained to Conference participants some of the crucial problems in physics that continue to haunt scientists today still and discussed the hard work scientists had to do in order to bring about the discovery of the Higgs boson, by using the Large Hadron Collider at the CERN international institute in Switzerland.

The Conference was traditionally accompanied by the Webfestival, a competition of Web content authors. The topic of this year's competition was mobile web. Out of 35 entries submitted in the two categories as distinguished according to the author (i.e. Individual and Group of Authors), the Webfestival jury selected the following mobile webs as winners in the two categories: Hranko – sastojci su bitni (Individual category) and Mobilno Njuškalo (Group of Authors category). Along with these awards, the jury decided to give an honourable mention to the Apsurdistan mobile web.

What is more, CUC 2013 included ten special events. Worthy of a highlight are the Birds of a Feather meetings on upgrades to the e-Matica service and new educational services required by the CARNet users, as well as a presentation of eduKnjižara, the new CARNet service for online e-book and e-textbook distribution.

The best paper presented at the Conference, as selected by the international Programmes Committee, is titled "What we learn, what we expect, and what awaits us in view of digital competences," written by Mr Zoran Kovač from the High School of Ivan Zakmardi Dijankovečki in Križevci. The best presentation held at this year's conference was chosen by the participants themselves to be "Teaching upside-down - Flipped Classroom Model in elementary school", written by Predrag Dukić and Maja Kalebić from Vidikovac Elementary School in Pula.

Pictures
Bum-Coo Cho, Samsung at opening of CUC 2013

The award for the most regular participant of the Conference, for which all the participants who registered for more than 75% of the lectures were nominated, went to Krešimir Ordanić from OŠ Oroslavje, while the award for taking the Conference survey was conferred to Domagoj Vuković from Faculty of Electrical Engineering in Osijek.

For yet another year in a row, a sys.trek competition was organized within the sys.trek section. The participants had to solve a prize puzzle which consisted of several steps, where Marko Meštrović from Knin University accomplished the greatest progress.

The Conference attracted 560 accredited participants, whereas the lectures were partially made available via video transfer on CARNet Media on Demand for those who did not take part in the Conference. The official language of the Conference was Croatian, but the foreign lecturers held their lectures in English.

For more information, see **http://cuc.carnet.hr**

NREN COMPENDIUM GOES GLOBAL

Part of GÉANT's Status and Trends work builds on the long-running and much-appreciated effort to document and explain the work of national research and education networks (NRENs), as laid down in the annual TERENA Compendium of NRENs in Europe. The 2013 edition, published in December, was the first to collect data through a Common NREN Information Model (CNIM) survey, which was the result of a global collaborative effort by APAN, ASREN, CANARIE, RedCLARA, TERENA, UbuntuNet and WACREN. Further Compendium evolution is under way.

The Compendium covers more than 50 NRENs in and outside Europe, and compares data across five years. A major trend is that many are deploying the next generation of high-capacity networks with innovative network architectures. A prime example is Germany, which has 100Gbps capacity on its core network.

Words
Laura Durnford, TERENA

Key innovations

In recent years, the spread of 'dark fibre' networks has enabled novel network architectures that are more cost-effective and better able to meet changing user demands. This is evident in the area of cloud services: 16 of the GÉANT partner NRENs offer cloud services that are not procured via a commercial vendor, and 11 others plan to do so.

More NRENs have started to develop and deploy Authentication and Authorisation Infrastructures (AAIs). These give users access to services independent of their physical locations. AAIs are now offered by 27 GÉANT partner NRENs, enabling the introduction of new services and the development of collaborative platforms.

There has been considerable growth in services for collaborative groups. Seventeen GÉANT partner NRENs offer these, up from nine in 2011. Most GÉANT partner NRENs have joined, or are planning to join, the eduGAIN interfederation service; holding the promise of increasing service access across identity federations.

Future plans

The printed Compendium relies on material collected via a web interface. In the past year, a new information system was developed which will allow new forms of reporting and easier querying of data through a new interface. At the same time, early in 2014, a second version of CNIM will be developed. Extra resources will be sought in order to enable more NRENs to share their successes and document their work, with the intention of developing this into a global Compendium publication by early 2015.

Further information
The full details of all NREN survey responses and a PDF version of the 2013 Compendium are available at: **http://www.terena.org/activities/compendium/**

CONNECT – COMMUNICATE – COLLABORATE: THE GLOBAL PR NETWORK

As the global nature of research and education (R&E) collaboration increases, so too does the need to create a unified voice for and on behalf of the networking community. A joined-up approach to communications has great value in raising the profile of R&E networking generally, as well as in the sharing of resources and tools for the promotion of services.

A global learning collaboration

The Global PR Network seeks to address these areas. Initiated at the TNC2012 in Reykjavik, it brings together PR and marketing professionals from the global R&E networking community to share experiences and best practice, and exchange ideas to improve collaboration. Most importantly, it forges a network of people eager to learn from each other and committed to promoting the benefits of research networking.

From a small group, the initiative has expanded its membership among NRENs and network organisations across all world regions, opening a global dialogue and forum to discuss topics of common interest. In addition to virtual meetings, annual conferences, such as the TERENA Networking Conference (TNC) provide opportunities for face-to-face discussions.

For instance, at the last TNC in Maastricht, at the joint meeting of the TERENA Task Force for Communications and Public Relations (TF-CPR) and the Global PR Network, participants compared notes on segmentation models, work priorities and activities in their respective countries. During the Birds of a Feather session, it was agreed that the global PR initiative could stimulate the development of new regional PR networks alongside those already established in Europe (TF-CPR) and Latin America, facilitating collaboration and best practise at local level, at the same time as benefitting from a global perspective.

Global services promotion

With geographical representation from across the world, the Global PR Network is well positioned to promote and so assist in the deployment and uptake of end-user services around the globe.. It can build on success stories such as the promotion and roll-out of eduroam from Europe to other world regions, where the promotional toolkit and messages around the service's benefits can be adapted to the local context to attract and inform users.

Other examples are the production and re-use of videos. AARNet's eduroam video has been re-worked and used by many NRENs around the world. The GÉANT project's R&E Connectivity and eduGAIN videos were originally produced in English, but have since been adapted into Spanish and made available to the Latin American communities.

The Global PR Network can build on these examples, and facilitate the creation and sharing of resources and tools for service promotion.

Benefits to society

Global problems require global efforts. This holds particularly true for widespread diseases such as dengue fever (nearly half of the world population is at risk!). R&E networks can facilitate the efforts of clinicians and researchers across the globe working to prevent and control dengue and find effective treatments by enabling the reliable transfer of lab data and collaboration tools, such as videoconferencing for the discussion of clinical cases.

Inspired by Francis Lee, President of SingAREN, members have engaged with researchers in their own countries and regions and invited them to attend a workshop on how R&E networks can support international dengue fever research at the APAN meeting in January 2014 in Bandung, Indonesia. The plan is to roll this out to other world regions.

What else is in the pipeline?

The Global PR Network has also started looking into the possibility of joining forces with universities and providers to promote the use of R&E networks for MOOCs (massive open online courses) - a global virtual classroom.

Words
Helga Spitaler, Senior Communications Officer, GÉANT

Picture
BoF at TNC in Maastricht

DANTE SUPPORTS FUTURE INTERNET TEST-BEDS

FUTURE INTERNET PPP

With the internet now such an essential part of society, it needs to adapt in order to help address growing societal challenges such as:

- How to improve quality of life
  - e-health
  - ageing population
  - social relations
  - inclusion
- Productivity
  - Competitiveness
  - Smart design
  - Intelligent manufacturing
  - e-Government
- How to decrease energy consumption
  - Smart electricity
  - Smart cities
  - Intelligent transport
- Disparities in economics and knowledge
  - e-learning
  - cultural heritage

Internet of Things

In parallel, technological changes such as the phenomenal development of processors in power, energy efficiency and cost reduction (driven in the main by the global smartphone market) has led not just to the emergence of very large sensor networks but also the ability to manage these networks via the Internet – aka the Internet of Things (IoT). To put this in context, predictions talk of between 25 and 30 billion devices on the IoT by 2020 – where data is submitted to the Internet by 'things' rather than humans. So if we thought there was a lot of data now...

Therefore, in order to rise to these challenges in a coordinated way, the European Commission has launched the Future Internet Initiative to drive collaborative knowledge and resources through a vast group of programs, each designed to support the re-imagining of the internet to reflect its changing role.

To support new ways to approach the internet requires early experimentation and testing in large scale environments. The Future Internet Research and Experimentation Initiative (FIRE) is addressing this need, creating a multidisciplinary research environment for investigation, experimentation and validation of innovative new ideas for network and service delivery.

Creating a federated research environment

For example, Fed4FIRE is a Future Internet project whose aim is to federate a set of existing independent test-beds to create a facility that will allow these experiments to benefit from multiple test-bed facilities as part of a single experiment. This implies a new approach to providing operational support to such experiments. Currently experiments are associated with an individual test-bed which provides them with support for that test-bed. In the context of a federation, this model will not work.

As part of the Fed4FIRE project DANTE is organising and providing a First Level Support service through its Network Operations Centre that will assist experiments using the federation. DANTE will also monitor the operational status of test-beds in the Fed4FIRE federation and proactively initiate problem resolution processes on detection of faults in an individual test-bed.

Tony Barber, head of the DANTE Network Operations Centre adds, "Having started in pilot mode at the beginning of 2014, the service is due to become fully operation on 1st February this year. Being able to support these important programs will help DANTE and GÉANT remain at the forefront of Future Internet technologies."

Words
Paul Maurice, Senior Communications Officer, DANTE

GLOBAL NEWS

By Tom Fryer, International Relations Officer, DANTE and Helga Spitaler, Senior Communications Officer, DANTE

GÉANT-REDCLARA INTERCONNECTION TO BE UPGRADED TO 5GBPS

A procurement jointly carried out by DANTE and RedCLARA in the autumn of 2013 has been successfully concluded with the awarding of a contract which will double capacity between GÉANT and RedCLARA to 5Gbps. The new link, to be provided by Telecom Italia Sparkle, is expected to be operational by the end of March 2014. Among the user groups who will benefit from this increase in capacity are high energy physics, astronomy and astrophysics researchers, future internet research and experimentation, and ultra-high resolution video collaborations.

CONNECTIVITY TO AFGHANISTAN UPGRADED TO 155MBPS

Connectivity to Afghanistan has been doubled to 155Mbps on a terrestrial fibre link between Kabul and Vienna. Funded by the SILK-Afghanistan Project, a total of 18 Afghan universities are now connected. As was reported in the July 2013 issue of CONNECT, a new organisation, AfgREN, is being set up to manage a dedicated national research and education network (NREN) for the country. Looking to the future, Afghanistan has also joined the pan-Asian TEIN research and education networking project, and a new high-speed network connection to the TEIN network backbone is planned for 2015.

FIRST AFRICACONNECT LINKS OPERATIONAL

The links obtained in the first AfricaConnect procurement are now operational. At a capacity of 622Mbps, the links interconnect South Africa, Mozambique Tanzania, Kenya, Uganda and Rwanda, enabling African traffic to be exchanged within the region for the first time, rather than via Europe. The procurement also provides a 622Mbps from the region to the UbuntuNet Alliance PoP in Amsterdam. A second procurement is currently in the process of being concluded and aims to connect Namibia, the Democratic Republic of the Congo, Zambia and Malawi.

GLOBAL NEWS

GÉANT REACHES THE STARS

On October 24, 2013, the GÉANT network literally brought the four corners of the universe together in a live video conference between Jerusalem, Milan, Munich and the European Space Agency's ATV-Albert Einstein at the International Space Station.

In a networking accomplishment worthy of the mission's namesake Albert Einstein, the European Space Agency (ESA), in collaboration with the Italian Space Agency (ASI), the German Aerospace Centre's Institute of Robotics and Mechatronics and the Israel Space Agency, organised a live video conference with ESA astronaut Luca Parmitano from the International Space Station. During the video call, participants and guests in Milan, Munich and Jerusalem enjoyed live interactive lectures by leading researchers from each institution on space robotics and satellite technologies, followed by a live video conference and Q&A session from the international space station with Luca Parmitano.

From A to Z, this ambitious networking collaboration was made possible by GÉANT's backbone network. The Politecnico di Milano is connected to GARR (**www.garr.it**), Italy's National Research & Education Network (NREN). The Technische Universität München in Germany connects via the German NREN, DFN (**www.dfn.de/en/**). The Hebrew University of Jerusalem, via IUCC (**www.iucc.ac.il**), connects universities and research institutions in Israel and across the globe with one another. The ESA's European Space Research and Technology Centre (ESTEC), in the Netherlands, is the ESA's largest facility and test centre and responsible for the technical preparation and management of ESA space projects and technical support to ESA's satellite, space exploration and human spaceflight activities. ESTEC leverages the power of SURFnet (**www.surfnet.nl/en**), the operator and developer of interconnected networking infrastructure for the higher education and research communities in the Netherlands. GARR, DFN, IUCC, and SURFnet are all partners in GÉANT, the pan-European research and education network, interconnecting Europe's National Research and Education Networks (NRENs) with over 50 million users at 10,000 institutions to support advanced research in a wide range of scientific disciplines.

Reaching for the stars and back again, in live audio and video, requires a network of "outer space" proportions. Europe's research and education networks have proven they are up to the job, thanks to GÉANT speed, security and capacity.
To experience outer space with ESA astronaut Luca Parmitano, search YouTube for "ATV Albert Einstein IN-Flight call event".

The ESA ATV-4 (Automated Transfer Vehicle) is one of the most reliable and complex spacecraft ever built in Europe. This particular mission to the international space station is named after Albert Einstein. It was launched from Europe's Spaceport in Kourou, French Guiana June 2013 to help keep the international space station and its permanent crew working at full capacity.

As part of ATV-Albert Einstein's cargo, the ESA sent a number of copies of documents from the Albert Einstein archives, maintained at the Hebrew University of Jerusalem. These documents were delivered to the Space Station and signed by ESA astronaut Luca Parmitano before returning to Earth.

Words
Audrey Gerber, IUCC-Inter-University Computation Center

INTERVIEW WITH BOUBAKAR BARRY, CEO OF WACREN (WEST AND CENTRAL AFRICAN R&E NETWORK)

In October 2013 Dr. Boubakar Barry assumed the office of CEO of WACREN. Dr. Barry joins WACREN from the Association of African Universities (AAU) where he worked from 2006 as Coordinator of the Research and Education Networking Unit. He is also serving a second term as Director of the UbuntuNet Alliance and holds a PhD in Nuclear Electronics and a Master's Degree in Nuclear Physics, both from the Technical University of Dresden, Germany.

As WACREN advances towards the first R&E connectivity between West and Central Africa and GÉANT, CONNECT caught up with Dr. Barry in December 2013 at the Africa-EU Cooperation Forum on ICT in Addis Ababa, Ethiopia.

Dr. Barry, you joined WACREN after some years at the African Association of Universities. Can you describe your work at the AAU and how it compares with your new role at WACREN?

At the AAU, I was Coordinator of the R&E Networking Unit (AAU REN Unit), set up in 2006 to address concerns about the high cost of bandwidth in Africa and poor connectivity for African higher education institutions.

There was already a very dynamic initiative in Eastern and Southern Africa (the UbuntuNet Alliance), and the REN Unit actions were oriented towards strengthening this initiative and promoting NREN establishment processes in countries where there were none. Consequently my activities focused on advocacy and sensitisation, policy development and capacity building.

The main difference now is that my focus is on West and Central Africa. But of course, as for my other colleagues in the UbuntuNet Alliance, ASREN and other sister organisations worldwide, collaboration at a global level is also high on WACREN's agenda.

In your first two months as WACREN CEO, what are the main challenges facing the WACREN Community?

Advocacy and sensitisation have had a very positive impact on the creation of NRENs. Policy and decision makers in most of the countries are now convinced of the critical role RENs can play for their socio-economic development. However, it is still a challenge to get commitments translated into concrete actions, namely the release of resources for the NRENs.

Most NRENs in the region are supported by their respective governments yet the governments seem not to understand that they have to invest first to get the benefit later. The other challenge is the telecom market with monopoly or near-monopoly positions hindering the reduction of bandwidth prices. The increasing number of players however will help to transform the market in the region. Things are improving.

Who are the member NRENs of WACREN are and what stage of development are they at?

As of today, NRENs are formally established in nine countries in the region: Ghana (GARNET), Senegal (snRER), Mali (MaliREN), Niger (NigerREN), Côte d'Ivoire (RITER), Gabon (GabonREN), Nigeria (NgREN), Togo (TogoRER) and Benin (RerBenin). Efforts to establish NRENs are also starting in Burkina Faso, Guinea, Chad and Cape Verde. There is also an NREN embryo in Cameroon.

Most of these NRENs are not yet operational but a number will go live in the next couple of months. For NgREN for instance, 27 federal universities are already interconnected. For snRER, the government has made capacity available on its own backbone and the necessary equipment has already been procured. Similar progress is also being seen in Ghana.

Overall we can expect at least three of the WACREN NRENs to be operational soon.

WACREN is planning to establish a point of presence in London and to connect to GÉANT. Which countries will first connect and what use cases do you envisage?

It will probably be Nigeria, followed by Ghana and Senegal. But the situation can evolve very quickly and other countries might be ready before them.

We are already working on strategies for building user communities in identified fields so that we can showcase the potential of the network.

Commodity Internet access will initially prove to be very important but we expect the usage pattern to change rapidly as R&E services are deployed and made available to users. Videoconferencing will be one of the first services made available, as there is a big demand for real-time communication services.

In a sense the UbuntuNet Alliance is a friendly, big sister to WACREN. Why is this relationship so important?

Our relationship with the UbuntuNet Alliance (UA) was established even before WACREN formally came into being, at a time when the community in West and Central Africa was trying to organise itself along the same lines as them. The AAU played an important role in bringing the two communities together.

There is a lot WACREN can learn from the UA, who are very cooperative and supportive towards us. We recently signed a collaboration agreement, another step towards building an even stronger relationship with them.

West and Central Africa also has strong ties with France. How do you perceive the benefits to WACREN?

The strong historical ties between France and many countries in the region have a positive impact on WACREN and RENATER relationship. We are happy that RENATER is ready to assist in areas like capacity building, sensitisation and counselling. In addition, IRD and CIRAD, two French research organisations with centres in several African countries are also very active in the framework of this collaboration agreement.

Visits by RENATER, IRD and CIRAD to a couple of countries in the WACREN region and the recent participation of five WACREN delegates in RENATER's annual conference are signs that the relationship between WACREN and France is very dynamic.

WACREN is also a partner in the ground-breaking AfricaConnect project. What are the benefits?

AfricaConnect concentrates on rolling out a network infrastructure in Eastern and Southern Africa, which is proving very successful. It also has a capacity building component which WACREN benefits from, for instance by enabling WACREN participation in conferences such as the 2013 RENATER Conference. We are ready for a potential extension of AfricaConnect to West and Central Africa.

Where do you see WACREN in five years' time?

It's difficult to make a precise statement. What I can say is that WACREN will be fully operational, interconnected with its sister networks worldwide, delivering cutting-edge services on a state of the art infrastructure, and that it will be an important player in the global research and education networking community.

GLOBAL NEWS

UBUNTUNET-CONNECT CONFERENCE HELD IN KIGALI

Transforming education and research was the highly relevant theme of UbuntuNet-Connect 2013 held at Lemigo Hotel in Kigali, Rwanda on 14-15 November 2013. The 6th in the series, the conference was hosted by one of the founding NRENs of the UbuntuNet Alliance, RwEdNet, the Rwandan NREN, with support from the Ministry of Education. Opened by the Minister of Education in Rwanda, Dr Vincent Biruta, the event was attended by approximately 150 participants from 33 countries.

Words
Tom Fryer, International Relations Officer, DANTE

The two days of the conference, rich in papers and exciting discussions, were preceded by a series of pre-conference events from 9-13 November 2013 featuring capacity building activities, project meetings and a workshop on e-infrastructure applications. The conference also presented an opportunity for the participants to meet and greet the newly appointed chairperson of the UbuntuNet Alliance, Professor John Ssebuwufu, who assumed office on 1st November 2013.

The conference programme featured 24 peer-reviewed papers. The first day covered subjects ranging from NRENs as organisations to services, progress of the AfricaConnect project and prospects for the second phase. The second day had two parallel tracks dedicated to e-content and applications, e-Infrastructure applications and NREN security.

At the end of the first day participants were treated to a cocktail hosted by the Minister of Education at Serena Hotel. They were entertained by the energetic dancing cultural troupe after which the participants joined the dancing, making the event more memorable. An inspiring speech was made by Hon Albert Nsengiyumva, Minister of State for Technical and Vocational Education and Training and a founding Director of the Alliance from 2006 to 2010, congratulating the current members and urging them to hold on to the early vision.

The concept of hosting an Annual Conference was part of the original Zomba Strategic Plan of the Alliance, formulated in 2006. The objective was to develop and brand UbuntuNet Alliance annual conferences for all stakeholders with sessions focusing on NRENs activities, technologies, research and applications among other topics. A further objective was to build partnerships with international, regional and national bodies to ensure effective delivery of advanced networking technologies, and resource mobilization. These objectives were certainly fulfilled in Kigali.

The presentations are already online on the UbuntuNet Alliance website and the Proceedings will be available by the end of January 2014.

For more information, see:
UbuntuNet Alliance:
http://www.ubuntunet.net/

GLOBAL NEWS

CONSTRUCTION OF A PAN-ARAB R&E NETWORK SHOWCASED AT E-AGE 2013

The 3rd "International Platform on Integrating Arab e-Infrastructure in a Global Environment" – e-AGE 2013 – took place 12 - 13 December 2013 in Tunis under the patronage of Dr. Moncef Ben Salem, Tunisian Minister of Higher Education and Scientific Research and alongside the 5th annual meeting of the Arab Organization for Quality Assurance in Education (AROQA). Hosted by Tunisia's EUMEDCONNECT3 partner, the Computing Center Al Khwarizmi (CCK), the event attracted more than 80 high-profile participants from over 30 countries spanning all world regions.

Ministers from Palestine and Libya and senior representatives of the League of Arab States and the World Bank made statements emphasising the importance of e-Infrastructure for the development of research and education across the Arab region and supporting the work of ASREN (the Arab States Research and Education Network). In a keynote speech Yousef Torman, co-Managing Director of ASREN outlined the progress and plans and the major contribution made by the EUMEDCONNECT programme.

At e-AGE 2012 in Dubai the previous year, ASREN had presented a status report on Arab e-Infrastructures, highlighting the digital divide faced by R&E in the Arab region compared to other world regions and the need to develop a regional network. A year on, ASREN took stock of efforts to secure long-term sustainability of e-Infrastructures in the region, including encouraging steps towards becoming a regional R&E network provider in its own right. In addition to having acquired its own IPv4/IPv6 address space and AS number, thanks to the support from DANTE and the EUMEDCONNECT3 project, ASREN has now also signed a contract with Telecity Group to set up ASREN's first European PoP in London. Additional regional hubs in Fujairah and Alexandria are planned and peering contracts are currently being negotiated with several Arab partners.

The agenda of the 2-day event featured various presentations from the user community, consistently insisting on access to the best modern communications technologies. Building on EUMEDCONNECT, ASREN sets out to provide Arab scientists, students and academics with a gateway to participation in world-class research and education. ASREN also recognises the importance of supporting end-user services on top of connectivity itself, pledging to promote the deployment and uptake of collaboration-facilitating services, such as eduGAIN, eduROAM, cloud computing and tools such as the Catania Science Gateway.

e-AGE 2013 also saw the signing of a Memorandum of Understanding between the Iraqi Ministry of Higher Education and Scientific Research and ASREN for it to support the development of an NREN in Iraq. This step reflects ASREN's mission to extend the geographical footprint of EUMEDCONNECT towards creating a truly pan-Arab R&E network potentially serving a population of 250 million in the Mediterranean and neighbouring Gulf region.

The conference was preceded by a joint EUMEDCONNECT/CHAIN-Reds meeting, which offered an excellent opportunity to exploit synergies between EC-funded projects in fostering cooperation and coordination between Arab and European researchers.

Tunis also hosted the training workshop "Network Management Tools for NREN NOCs" run by an enthusiastic NSRC (Network Startup Resource Centre) team which equipped current and aspiring NOC engineers in the region with hands-on advice. The workshop was funded by the EUMEDCONNECT3 project and is a tangible outcome of the MoU between DANTE and NSRC in connecting the least connected.

"e-AGE has established itself as the principal forum for the Arab R&E Community. There was a noticeably upbeat atmosphere in Tunis in the meetings and in the corridors as the many participants addressed the practical steps to construct the e-Infrastructure for the Arab region. This year's e-AGE demonstrated the growing global interest in the region and focussed on the concrete steps being taken by ASREN and Arab NRENs to develop Arab e-Infrastructures and interconnect with research networking communities in other parts of the world. I thank ASREN and CCK for their hard work and successful organisation of the event."

David West, EUMEDCONNECT3 Project Manager

For more information, including the Tunis Declaration and a full set of presentations, please visit **http://www.eumedconnect3.net/Media_Centre/Pages/network-showcased-at-e-AGE-2013.aspx**

Pictures
(Left to right)
The NSRC and ASREN team with participants of the NSRC workshop

Signing of MoU between Iraqi Ministry of Higher Education and Scientific Research and ASREN

NSRC workshop certificate ceremony

Words
Helga Spitaler, Senior Communications Officer, DANTE

“HELIOS” AND GÉANT CONNECT AT EUROPE’S BIGGEST ICT MEETING POINT

“Helios” ranks as one of the top supercomputers in the world. It is part of the Broader Approach, the fusion energy partnership between Europe and Japan, and hosted in the International Fusion Energy Research Centre (IFERC) in Rokkasho. Producing vast data sets, it relies on the extra bandwidth offered by GÉANT to connect scientists all over the world collaborating on energy research projects such as ITER, and its follow-on project DEMO.

Both Helios and GÉANT enjoy an international outlook and have a clear commitment to public research and innovation. Seizing the opportunity to participate in Europe’s biggest ICT conference, hosted in Vilnius, they demonstrated the benefits of international cooperation by highlighting the direct contribution of ICT in shaping tomorrow’s energy mix.

Parallel thematic sessions, networking events and a vibrant investors’ forum maintained the interest of nearly 5000 people from the ICT industry, SMEs and innovation centres eager to showcase their latest achievements.

Susana Clement Lorenzo, F4E Group Leader for IFERC said:

“Our joint participation with GÉANT has revealed a new target audience interested in “Helios” purely from a technical perspective. They are impressed in its IT capacity and potential contribution to applied research. For those interested in the field of fusion, I can say that the supercomputer is high on demand. In the last call for Helios, researchers requested three times more computer time than available. 80% of the computer time is allocated to projects submitted to the calls jointly judged on their merit. The remaining 20% is evenly split between Europe and Japan. We plan to carry out further enhancements to the supercomputer’s operational system, and to offer more training courses in 2014 to prepare the scientific community for the next generation of supercomputers.”

Michael Enrico, Chief Technical Officer at DANTE, said: “Our mission is to support cutting-edge research that works towards solving society’s grand challenges so we are delighted to be an important partner to “Helios” and part of ITER, the biggest international collaborative project in energy research.”

Words
Aris Apollonatos, Information and Communication Group Leader, Fusion For Energy

GÉANT is the pan-European research and education network that interconnects Europe’s National Research and Education Networks (NRENs). Together we connect over 50 million users at 10,000 institutions across Europe, supporting research in areas such as energy, the environment, space and medicine.

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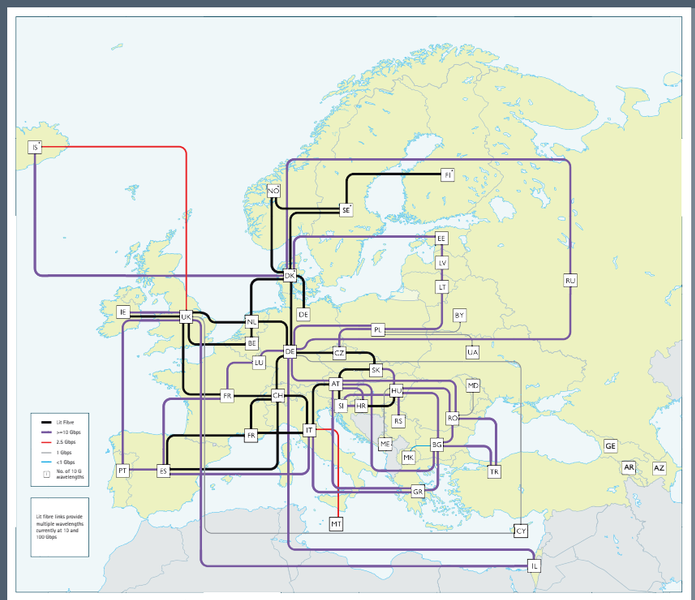

Backbone topology as at August 2013. GÉANT is operated by DANTE on behalf of Europe’s NRENs.

GÉANT Partners

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SEVENTH FRAMEWORK PROGRAMME

DANTE

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