

FASTER SCIENCE! EUROPE'S NEW TERABIT NETWORK



**WORKING WITH
MICROSOFT**
BOOSTING CLOUD ACCESS
AT UK UNIVERSITIES

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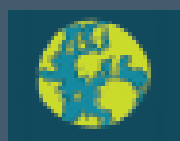
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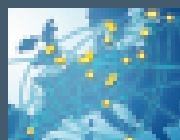
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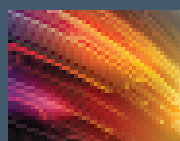
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CONNECT is the quarterly magazine from the GÉANT community; highlighting key areas of interest, updates on the project and its vital work supporting European research and education. We give insights into the users who depend on the network, and the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

connect@geant.net

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SAME, BUT DIFFERENT!

Immediately before writing this I was in Prague for a DANTE shareholders' meeting, alongside the usual collection of meetings that characterise the European collaborative approach to all that DANTE does. Our hosts, CESNET, provided us with the opportunity not only to mark DANTE's 20th birthday (modestly of course, as befits the times), but also to reflect on the history of international R&E networking. At TERENA's Networking Conference in Maastricht a few weeks earlier (and an opportunity to celebrate another birthday – SURFnet's 25th), global collaboration was also very much featured – as you can read in Cathrin Stöver's article.

In those early days we very much "did it ourselves". The way was led by a small band of talented and like-minded engineers and

managers (money was also needed, even then). By doing so together they showed how networks could be built to be faster, more robust and more innovative. As true today as it was then.

Nowadays we can no longer do everything ourselves. We need to work with like-minded organisations to meet ever-increasing demands from users. The article about Janet's cloud services partnership is an approach we'll see used much more. But it doesn't end there. It will be by NRENs and DANTE working closely with peer organisations across the whole e-infrastructure space that we'll continue to innovate and provide new services across Europe and beyond.

DANTE can justly be proud of its pivotal role in "20 years of networking excellence".



Words
Bob Day,
Chairman,
DANTE

The challenge for the next decade will be to forge new relationships as well as continuing to nurture existing partnerships. DANTE's corporate strategy is "more for all" – exactly!

WELCOME TO FASTER SCIENCE

It's been well over a year since GÉANT began refreshing its entire European infrastructure to a state-of-the-art terabit network, and we are thrilled to announce its completion in this issue.

When the European Commission made its own announcement, Neelie Kroes commented, "The data side of the research equation is almost as important as the research itself today," – highlighting just how vital high-speed networks have become to the advancement of modern science. Never has 'watch this space' carried so much significance, with faster science offering awe-inspiring possibilities for society and the planet as a whole.

Congratulations to everybody who played a part in this major development for research and education. Read the news story on page 4.

'Regional research networking' takes an in-depth look at some of

the regional projects connected to GÉANT and the successes and challenges they have seen over the past decade. What will the future bring for global networking? Find out our partners' thoughts on page 8.

Turn to page 20 to learn about NEXPreS, a ground-breaking radio astronomy project which has dramatically improved astronomical results, by successfully trialling new advances in research networking technology.

To give you the chance to meet some of the many people who make the network what it is, we've introduced a new regular section: CONNECT interview, a behind the scenes look at what people from different teams do on a day-to-day basis. Fancy sharing your own story? Get in touch with us at

connect@geant.net

Happy reading!



Editors
Paul Maurice
& Tamsin
Henderson



DANTE CELEBRATES 20 YEARS OF NETWORKING EXCELLENCE

IN JULY, DANTE CELEBRATED ITS 20TH ANNIVERSARY

Founded in 1993 as a not-for-profit organisation to provide a high-speed internet network for the European research community, DANTE has since created four consecutive generations of this network, which we all know and love today as GÉANT!

In 2000, the European Commission used GÉANT as an exemplar for networking excellence and began funding similar networks all over the world. Suddenly DANTE became not just a networking and service innovator, but the project manager and coordinator of these very large-scale projects, connecting different world regions to Europe via GÉANT.

Neelie Kroes, Vice President of the European Commission, said:

"I give my full congratulations to DANTE for 20 years of networking excellence. DANTE's work is essential to the European and global research community. World-class internet networks, through GÉANT and the regional networks it manages, are fundamental to realising the EU's 2020 vision for the European Research Area, and key to helping us tackle societal challenges such as food and energy security, health and ageing, and environmental protection. DANTE has my full support and well wishes to continue its innovative journey in support of research and education, across Europe and beyond."

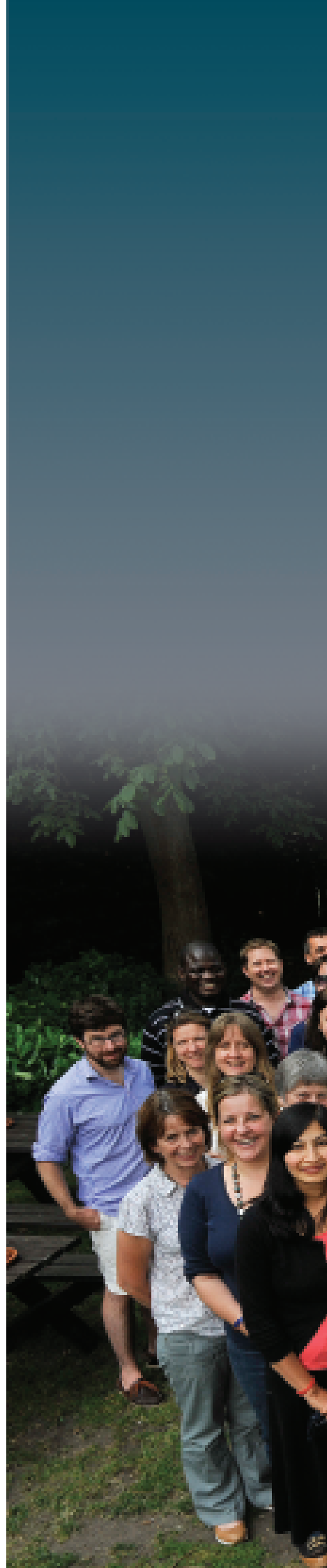
DANTE plans, builds and manages these projects on behalf of the European Commission and Europe's National Research and Education Networks (NRENs), serving Europe (GÉANT), the Mediterranean (EUMEDCONNECT), Sub-Saharan Africa (AfricaConnect), Central Asia (CAREN) and Europe-China collaboration (ORIENTplus). DANTE also supports R&E networking organisations in Latin America (RedCLARA), Caribbean (CKLN) and Asia-Pacific (TEIN*CC).



TWO DECADES OF RESEARCH AND EDUCATION NETWORKING

Niels Hersoug and Matthew Scott, Joint DANTE General Managers, said:

"Twenty years ago we could never have dreamed that research and education networking would grow to the extent it has today. By enabling people to work together, regardless of location, and to effortlessly exchange huge volumes of data, DANTE's work is advancing innovation, economic development and productivity in ways that will benefit us all. Be it through advances in climate research, medical developments, food production or high-energy physics; they all rely on the high-speed networks of DANTE and its partners."



WHY WAS DANTE CREATED?

Although research networking in Europe first started in the late 1970s, it was limited to the developments of individual countries and their National Research and Education Networks (NRENs).

It soon became clear that a centralised approach was required. The NRENs grouped together and created DANTE to manage pan-European research networking on everybody's behalf.

HOW IS DANTE ACCELERATING RESEARCH AND EDUCATION?

Most research today is data driven and often a collaborative effort between people, institutions, countries and even disciplines.

The ability to transmit this data at high-speeds has benefits for tens of millions of people in schools, universities, research institutes and big science projects alike. Many worldwide projects and partners rely on DANTE in order to serve these communities.

"We have come a long way in 20 years. In 1993, we were building networks with 64 Kbps connections. Today we use 100Gbps a factor of one and a half million increase. But it is not just about technology, services play an increasing role enabling all researchers, not just the technically literate, to benefit from R&E networks. It is difficult to believe now, but in 1993 e-mail was a new service. Today we offer many more advanced services allowing researchers to manage their own network needs."

Dai Davies. Co-founder, DANTE





FASTER SCIENCE!

GÉANT'S NETWORK UPGRADE OFFERS EUROPEAN SCIENCE THE NETWORK OF THE FUTURE.

It's been just over a year in production, but Europe's critical research and education backbone is now ready for the terabit era!

Since then, as part of a carefully phased migration designed to minimise service disruptions, DANTE has, on behalf of Europe's National Research and Education Networks (NRENs), delivered circuits across Europe that will allow individual users to transfer data in multiples of 100Gbps – helping to speed up the transport and subsequent analysis of critical research data. After an extensive procurement process, Imtech/Juniper Networks and Infinera were contracted to build this next generation of the network. Juniper supplies the MX series Universal routers with 100Gbps capability, underpinned by Infinera's latest DTN-X optical transmission platform, designed to provide 500Gbps super-channels across long-haul distances.

The network has been designed to support up to 2Tbps capacity across the core network, effectively future-proofing it until 2020 and providing over 50 million users with superfast and highly resilient terabit networking.



Said Neelie Kroes, Vice President of the European Commission:

“Today data speeds and processing are as critical as the research itself, and a super-fast network means we are closer to achieving a European Research Area, and to successfully dealing with challenges such as food and energy security, health and ageing and environmental protection.”

Mark Johnston, DANTE's Chief Network Operations Officer, said:

“The project to upgrade the GÉANT network involved renewing 50,000km of backbone infrastructure and the replacement of legacy equipment with leading-edge transmission and switching technologies, a significant undertaking and long term investment. The new network brings several key benefits: greatly increased capacity, faster provision of service, and even higher levels of resilience.”

Leading edge technology also means new circuits can be ‘switched

“That’s a whopping amount of capacity for the network, which connects Europe’s national research and education networks (NRENs) with one another and also with overseas counterparts – in total, the network takes in 32,000 universities, schools, research institutes, hospitals and so on. And the result is just as impressive for individual researchers, who will now get connection speeds of up to 100Gbps each – that’s 1,000 times more than the pretty darned impressive cable connection I’m using as I type.”

David Mayers, Senior Reporter, GigaOM (the leading independent voice on emerging technologies with an audience of 5.5 million monthly unique readers).

on’ within the hour. In addition the innovative option of ‘on-demand’ services accommodating short-burst transmission of large data can be offered across the GÉANT backbone.

Finally, increased resilience and the network’s ability to ‘self-heal’ guarantees continuous service even in the unlikely event of faults occurring on part of the network – meaning the assured transfer of time-sensitive critical data; further building GÉANT’s reputation for speed, flexibility and resilience.

WHY DOES EUROPE NEED A TERABIT NETWORK?

Already over 1,000 terabytes of data passes through GÉANT’s IP backbone each day, much of it linked to some of the most advanced and far-reaching research being carried out anywhere in the world. However, the creation and sharing of research data is increasing exponentially, impacting research networks, high performance computing and grids – collectively known as e-infrastructures.

Many major projects involving global partners, such as CERN’s Large Hadron

Collider (LHC), the forthcoming Square Kilometre Array (the world’s largest radio telescope), and many bioinformatics projects generate massive amounts of data that need to be distributed, analysed, stored and accessed. This need for fast, stable transfer of data depends heavily on the high speed and dedicated bandwidth offered by research networks such as GÉANT and the need for a terabit network is growing every day.

In a joint statement, Matthew Scott and Niels Hersoug, Joint General Managers, DANTE, said: “This major investment in global networking technology is an essential step which supports the important work of the European research community. Scientific disciplines, from earth observation and weather forecasting to chemistry and neuroscience, will benefit from the GÉANT network and we are excited to see how this next-generation terabit network further develops the advancement of science.”

In the next issue of CONNECT we will delve deeper in to the network migration, learn how this enormous task was delivered and cover some of the more surprising benefits we’re likely to see as a result of the upgrade.

CONNECT INTERVIEW

PAUL ROUSE,
PROCUREMENT



Collaborative infrastructures offer collective procurement opportunities, with benefits including better planning, risk management and cost savings based on economies of scale. DANTE has been providing a procurement service since its inception 20 years ago.

DANTE procurement now provides services to the GÉANT project, necessitated by a dramatic growth in demand in recent years. Headed up by Paul Rouse, the GÉANT procurement office is now a vital component of the project. CONNECT spoke to Paul about his role, his objectives for the service and the growing scope of work.

WHY IS PROCUREMENT SO IMPORTANT? WHAT VALUE DOES IT ADD TO A PROJECT SUCH AS GÉANT?

Efficient, cost-effective procurement is central to the success of GÉANT and research networking in general.

With a significant proportion of the GÉANT budget going to 3rd party suppliers – for example: in 2013, 79% of the €42 million budget controlled by DANTE for GÉANT is being spent on goods and services to operate the GÉANT project/network – it's easy to see why the project needed a dedicated procurement team.

Our mission is to always seek out the best quality at the best value. As we are ultimately funded by the public purse, we work hard to comply with the EU Public Contracts Directive – a condition of our funding – so getting value for money is at the heart of everything we do.

WHAT PROCUREMENT PROJECTS ARE YOU WORKING ON AT THE MOMENT, AND WHAT IS THEIR EXPECTED IMPACT?

The past year has been really busy for DANTE Procurement. We have secured supply of dark fibre for the network until 2020 and reduced the cost of the capacity we buy in for our network by over €3 million. We are now starting to work on procurements

that can help the National Research & Education Networks (NRENs) through aggregated procurements, such as Project PRISM.

We have grown the team with the addition of Procurement Consultant, Phil Matthews, who has come on board to help us on some new projects such as AfricaConnect – a project to establish a regional research and education (R&E) network in Southern and Eastern Africa, working with the UbuntuNet Alliance.

WHAT DOES IT OFFER REGIONAL NETWORKS BEYOND EUROPE?

Project PRISM is an example of how DANTE can undertake procurements on behalf of other NRENs. This benefits them by not having the overhead of having to run lengthy and complex EU Procurement Procedures via the Official Journal of the European Union (OJEU). The other benefit is that it allows us as a community to secure better prices by aggregating our demand to the market and for some NRENs giving them access to markets where their spend alone would not allow them to go previously.

The framework agreements for optical transmission equipment from Project PRISM will be available for NRENs to use from November 2013. We are also starting to work on other collaborative arrangements in areas such as cloud service.

HOW DO YOU SEE THE NEED FOR INCREASED GLOBAL COLLABORATION AFFECTING YOUR ROLE?

Because procurement laws and regulations are not harmonised globally, we must balance complying with local procurement regulations, with working with parties subject to completely different laws. We need to work to influence and develop supply markets on a global basis.

HOW DOES PROCUREMENT IN RESEARCH NETWORKING COMPARE TO OTHER INDUSTRIES?

The common goals of procurement remain: value for money, security of supply, innovation and risk reduction, however being able to say you have purchased the parts of the network that are used to transform lives or make new discoveries is really rewarding.

**Paul Rouse,
Procurement
Manager**

**Phil Matthews,
Procurement
Consultant**

**Alex Gosnell,
Procurement
Assistant**



Organogram
DANTE's
GÉANT
procurement
team

WHAT DO YOU ENJOY MOST ABOUT YOUR WORK?

The people, places and interesting and challenging projects

LAST MOVIE YOU WATCHED?

With my sons to see Despicable Me 2 – a great fun movie with some surprisingly good songs on the soundtrack.

WHAT ARE YOU READING?

I've just finished Bradley Wiggins autobiography.

WHAT'S ON YOUR IPOD?

I always like listening to Bob Marley when the sun comes out.

WHAT DO YOU DO FOR DOWNTIME?

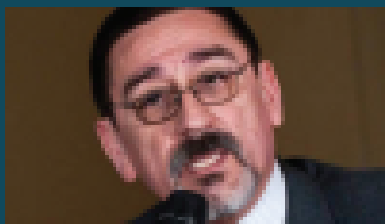
Family, boats and road cycling.

REGIONAL RESEARCH NETWORKING – PAST, PRESENT AND FUTURE

In the last 10 years, the global reach of European research & education (R&E) networking has increased significantly, with the first regional projects (EUMEDCONNECT and ALICE) beginning in 2002 and 2003 respectively. The past decade has brought enormous progress in the creation and development of national and regional R&E networks around the world. Here some key players describe their experiences – their challenges and successes in that time, and consider what the future will bring.



CONTRIBUTORS



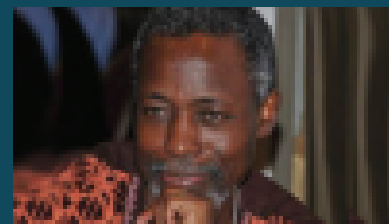
Dr. Florencio I. Utreras, Executive Director of CLARA, the Latin American Cooperation of Research Networks.

Florencio has been involved in research networking since 1987. Before joining CLARA, he was the Executive Director of REUNA (the Chilean Research Network) since 1992 and previously had been full professor of Applied Mathematics at the University of Chile and Visiting Professor at several universities and research centres in Europe (France, Italy) and the US.



Ken Sylvester, CEO of the Caribbean Knowledge and Learning Network.

Prior to CKLN, Ken enjoyed a substantial career with Fujitsu including several executive positions including Vice President of Fujitsu North America and President and CEO of Fujitsu Caribbean. He has been special advisor to several Caribbean governments on ICT issues and has written several papers on the role of ICT in economic and social development of small island states.



Dr. F F Tusubira (Tusu), Member of the Board and CEO of UbuntuNet Alliance for Research and Education networking in Africa.

Tusu is a thinker, advocate and consultant in ICT for development at national, regional and international level. As well as his roles at UbuntuNet Alliance, he is also a member of the Board of TENET (the R&E network of South Africa); the Internet Educational Equal Access Foundation; and the Global Development Learning Network; he is also a member of the Advisory Panel to the R&E Networking Unit of the Association of African Universities.



Professor Askar Kutanov, Regional Coordinator for EC Central Asian Research and Education Network (CAREN) Project.

Askar actively promotes regional and international collaboration for Central Asian NRENs. He has an extensive background in science including a fellowship at Osaka University in Japan, and is an Academician of the Kyrgyz National Academy of Sciences. Askar was awarded the Certificate from NATO Assistant Secretary General for Public Diplomacy in recognition and appreciation for his invaluable contribution to the success of NATO Virtual Silk Highway Project (2001-2009) for Central Asia and Caucasus regions.



Professor Bu Sung (Francis Lee), Founding and current President of Singapore Advanced Research and Education Network (SingAREN); Chair of the Board of Governors of TEIN*CC.

Francis Lee is a key figure on the R&E networking scene in Asia Pacific. Not only has he been instrumental in setting up SingAREN, the NREN in Singapore, but he has also been a pioneer for the TEIN network. Prof. Lee is the founding Chair of Governors of TEIN*Co-operation Center (TEIN*CC), a non-profit-organisation in Korea that took over TEIN network management from DANTE in 2012.



WHAT WERE THE CHALLENGES AND HURDLES FACED WHEN SETTING UP THE NETWORKS, AND WHAT HAVE BEEN THE SUCCESSES?

Dr. Florencio Utreras, RedCLARA (Latin America)

The challenge of connecting countries in Latin America to one another, and then connecting as a region to Europe began to be addressed over 10 years ago. At the time, there were some cables coming into countries such as Brazil, but these were mainly for telephony and the cost was simply uneconomic. The cost of connecting to your neighbour was more expensive than each country connecting to the US, holding back the chance to build an interconnected region.

We faced several challenges:

COST OF INFRASTRUCTURE

The cost of connectivity at this stage was prohibitive. In some regions the cost of connecting a country was 10 times what was affordable. Often the cost of bringing connectivity to a country's border/shore was acceptable, but extending that *into* a country was far higher – by a factor of five in some cases. Our goal was to create a regional network, with connectivity between members, and then for that region to be connected onwards to places like the US and Europe.

LACK OF GOVERNMENTAL SUPPORT

At the time 5 NRENs were already working together and had some connectivity to the US, but all the other organisations which are now NRENs were subsequently created as part of the project. However not all NRENs have support from their government, and they have to sell their services to the universities. So that issue of helping to set up NRENs, and trying to gain the support of regional and national governments has been a real challenge.

Dr. Francis Lee, TEIN (Asia Pacific)

Looking back 10 years, at the time we had the Asia Pacific Advanced Network, so there was already a regional network. Countries like Japan and Korea would approach individual APAN countries and arrange bilateral connections. The challenges we faced were:

COST

The expense of international links was very high, and although individual NRENs approached telcos to try and reduce the costs, they would not budge. But with the setup of TEIN, with its budget and combined purchasing power, a tender was put out and the price really came down. Now we have not only far more connectivity, but efficiency in engineering the network, so countries have direct connections to each other rather than having to go via other countries, such as Japan or USA, to connect.

“MORE WELL CONNECTED, AND MORE DIRECTLY CONNECTED TO EACH OTHER”

BUILDING COMMUNITY

However, one of the challenges we faced in the early days was changing the way things were done: people were used to negotiating individually. So many discussions at this stage were aimed at getting people to work together with a common vision for the common good of the community. However we all recognised that we are a community of people and we belong to this community, and through that we agreed to work together. So TEIN has not only helped to build local communities, but has helped us as a region to directly connect to other areas of the world such as Europe and the US.

ORGANISATIONAL

More recently, with the TEIN*CC project, TEIN members have taken over the running of the TEIN project from DANTE. Although this results in greater organisational, administrative and bureaucratic work as we work directly with the European Union, the community as a whole has said yes, we can deal with this together.

Ken Sylvester, CKLN (Caribbean)

The Caribbean is made up of around 15 islands, with a combined population of around 5m people. However with some states having a population of just 40,000 and most only around 100,000, the characteristics of island states mean that we face our own set of challenges. We just cannot be globally competitive individually, as we cannot achieve economies of scales, whether it's in areas of education, manufacturing or agriculture. Around 10 years ago, we were struggling. The economy was a mess, and over 75% of graduates were migrating to Europe or the US.

Innovation was required to move beyond this situation, and to achieve this, leaders had to collaborate and work together, sharing resources, creating partnerships and building centres of excellence. After hearing about the successes in Latin America, leaders were convinced that the Caribbean had to be part of 'research and education networking'. In 2006, the European Commission offered €10m to the Caribbean, subject to a proposal that was quickly put together (in just a week) with the help of the ALICE project. This was successful and CaribNET was built, launching in February 2013 and connecting all 15 states, as well as Internet2, RedCLARA and GÉANT. The clear success factor was governmental support – it was championed by the Caribbean minister for science and technology to all the states in the region.

SO WHAT WAS THE CHALLENGE?

Playing catch up! Having built the network to connect countries, the need for NRENs was then clearly realised, as part of the need to connect schools, universities and other organisations within the individual states. Additionally, many campus networks had to be developed. So the past two years have seen some rapid reverse engineering to fast track the development of NRENs, so that they and the organisations can leverage the network for development and innovation.

Dr F.F. Tusubira, UbuntuNet Alliance (Africa)

The UbuntuNet Alliance started in 2007 as a membership organisation – without any network. So the challenge at the outset was very different. It was to build a community around a common need, before we built the infrastructure. That need was sufficient access for universities.

It took around 2 years to establish first a committee of individuals and then communities, around a central ethos, based on the Ubuntu philosophy:

“MUTUAL RESPONSIBILITY FOR EACH OTHER AND TO EACH OTHER”

Our first challenge was to build (human) capacity and develop interaction with governments and regulators which would lay the foundation for putting in place the networks.

What exists as UA today was built from Africa to Europe, and the approach to the EU for support came around 2006. The investment has over time helped to build and then fill the gaps in networks, and this process has been built firmly upon trust.

HOW HAS CULTURE IMPACTED THE GROWTH OF REGIONAL NETWORKING – AND WHAT HAS BEEN THE EFFECT OF NETWORKS ON REGIONAL CULTURES?

Human networking is often considered every bit as important to successful R&E networking as cables in the ground. Therefore building and developing regional networks and communities can be heavily impacted by culture, or more accurately cultures – from what are often geographically enormous regions.

THE CARIBBEAN: MOVING FROM ‘EVERYTHING IS OK’ TO ‘LEADING EDGE ICT’

KS: The historical culture of the Caribbean, exemplified by the phrase “Jamaica no problem” is perhaps inconsistent with a world which is interconnected, globally competitive, a world where innovation requires investment, science and technology. The challenge is how to get people to embrace leading edge ICT to drive innovation and development. For instance, the call for R&E networking didn’t come from the universities as it has elsewhere, but rather from a government seeking economic growth and development.

WERE THERE SIMILAR EXPERIENCES IN LATIN AMERICA?

FU: The culture of innovation is interesting and something that governments are trying to foster. This involves being creative, being allowed to fail, and then pushing ahead with the next idea. However, failure is not an option in Latin American countries, and by seeking regular success you become more risk-averse. As an NREN when you propose new things, it takes time for ideas to be accepted. However, thanks to early successes in ALICE, and because many of the leaders of NRENs are recognised for being the ones who first talked about the internet, and setting up ISPs, they have gained respect from telcos and from governments. However, when you propose something different to that in which you’ve previously succeeded, they don’t necessarily believe you.



IN THE DEVELOPING WORLD, IS EDUCATION THE MORE IMPORTANT PART OF 'RESEARCH AND EDUCATION' NETWORKING? DOES INNOVATION TAKE A BACK SEAT?

ASIA'S DIVERSITY IS ENORMOUS

FL: The experience of TEIN is that because of the great diversity in the region, there is not a single answer: different groups are at different levels of progress, and have different requirements, so we are covering research, education and development. Some need assistance on the developmental/educational side, whilst others are really pushing the boundaries of the network and services. This challenge is partially answered by the community approach as more developed countries can assist others, and benefit from the cooperative approach in building the network and resources.

AFRICA'S INNOVATIVE MINDS WANT TO BE UNLEASHED

Tusu: The UbuntuNet Alliance considers innovation to be the very essence of what we as NRENs are. Whilst the developmental contribution of research and education networking is well recognised, it is the unleashing of the innovative minds of the Africans that is really exciting, something that will rapidly increase once equal access to resources is achieved.

It is not about the physical network. The UbuntuNet Alliance is seeking to stimulate this innovation through annual conferences which look at how e-infrastructures are being exploited to support development, and research into areas such as genetic research, environment and disease.

HOW ARE THE NETWORKS BEING USED TODAY?

AK: CAREN is relatively young regional network compared to TEIN and ALICE. Ten years ago we began to establish our NRENs in Central Asian countries under the support of the NATO Science Programme and NATO Virtual Silk Highway project. There are three main areas where research networking is making a real difference:

TWO WAY COLLABORATION

In Central Asia environmental projects are not only helping the local region but are providing valuable data in modelling programs which can help other areas of the world. For example, glacial monitoring has involved global collaboration with researchers in Europe, meaning we can compare patterns of melting between glaciers in the Austrian Alps, Sweden and Kyrgyzstan.

Environmental

Central Asia is extremely mountainous and given our physical position earthquakes are a constant threat to infrastructure, population and therefore development. By working together using CAREN the countries of Central Asia have been able to build an earthquake model for the region, which helps provide better understanding and early warning to mitigate the devastating consequences of earthquakes and other natural disasters.

e-learning and telemedicine

Being located between Asia and Europe means CAREN naturally seeks to collaborate with both of these regions. e-Learning enables us to achieve this, increasing the knowledge and skills we have in our countries and directly helping us develop. For example, by working with colleagues in Europe, Turkmenistan's Gün Institute has developed into a centre of excellence in solar power, with over 700 people trained remotely, creating the foundations of a vibrant local solar industry. This year collaboration on telemedicine with medical doctors in Asia united to TEIN Medical working group has been started.

LATIN AMERICA – PROVIDING THE TOOLS FOR ALL

FU: There are many enormous 'big science' projects in Latin America, such as the astronomical telescopes in Chile and the Auger Cosmic Ray Observatory in Argentina. Research networks are obviously a vital part of sharing information and driving collaboration for these projects. Connectivity is also at the heart of improving the lives of the people of Latin America – the Brazilian T@lemed telemedicine project brings the skills and services of large hospitals to rural communities.

But we see a real need to move beyond large scale projects to make it simple for researchers in many areas, such as in biodiversity or seismic studies to work together. To collaborate, these communities need tools, so we have created a portal that brings together, in one place, many of the software tools they need. So they can easily access and install video conferencing software for example – in fact this is now being 'exported' back to Europe as it is being used in collaborative projects between Latin American and European researchers.

LOOKING FORWARD, WHAT ARE THE OPPORTUNITIES AND CHALLENGES OF THE NEXT TEN YEARS?

CARIBBEAN

KS: As many people have said, technology is levelling the playing field across the globe. The world will be flat – with equal opportunities for all, rather than the current divides between regions. Research and education networks are a tool that can accelerate this process and help the Caribbean tackle our key challenges of research, education, health and climate change. We want to engage with the world through sharing best practices and pooling our knowledge. There are unparalleled opportunities – the whole ethos of the R&E community is ‘I can help’ and this makes collaboration much easier on both a physical and cultural level.

AFRICA

Tusu: The sparks of development can come from anywhere. We’re entering a world of global collaboration and broadband for all means opportunities for all.

ASIA

FL: The future is not about Europe and Asia working together, but about true global collaboration. We need to develop those countries that don’t currently have NREs and give them the tools to join the community. NREs need to ensure they are always relevant to their governments and users to safeguard their existence.

LATIN AMERICA

FU: To get the equal opportunities we’re talking about, more does need to be done on the infrastructure side. Our networks need to be equal to those in Europe and North America – the speed of access to knowledge is still greater in developed countries. The market alone will not solve this – so we as a community need to invest in new technologies which will benefit us all.



CONCLUSION

PAST

Regional networks have helped bring down costs of connectivity and have helped people to come together and work as communities.

PRESENT

The benefits of networks are incredibly diverse - in research collaboration, education and helping develop individual countries and regions. They are also driving innovation, changing traditionally risk-averse cultures across the globe to make them more open and ready to embrace new ideas.

FUTURE

The world of the future is flat, with equal opportunities for all. Investment is needed to both improve network capacity and speeds and to reduce costs through low maintenance networks that are controlled directly and are consequently cheaper to run.

This article is based on the TNC 2013 panel session, "A decade of collaborative R&E networking around the globe" - see <https://tnc2013.terena.org/core/session/28>

PERFORMANCE U! FIRST SCHOOL A GREAT SUCCESS

Alessandra Scicchitano, eduPERT Task Leader

eduPERT launched the Performance U! school sessions with a very successful event in Zurich this Spring.

The school is one of the events within the eduPERT Performance U! project and was held this year in Zurich, 6-8 March. The first part of the event was dedicated to topics like TCP and investigative tools with the second part experimental, and dedicated to new topics like performance in virtualisation, Infiniband and SDN.

Over 20 people attended the school and the agenda had included invited speakers who all contributed greatly to the success of the event.

Subjects covered included:

- TCP
- Multipath TCP over SDN
- OpenFlow and SDN
- Infiniband
- Virtualization
- Assessing overseas performance issues
- Investigative tools
- PerfSONAR MDM

The full programme of the Performance U! School – including videos of all the presentations – can be found at <http://edupert.geant.net>

EDUPERT

As cross-domain and cross-functional working becomes the norm rather than the exception, the ability to monitor, manage and fault-find complex systems will become increasingly valuable. With the ever-changing face of the technologies involved, it is essential that teams have access to the latest information, tools and experience from other experts.



Performance Enhancement Response Teams (PERTs) provide an investigation and consulting service to academic and research users on their network performance issues. If they have an issue (for example low throughput, slow response times, or degradation), typically the user will contact a PERT directly or through standard IT support channels. To diagnose problems a PERT considers the complete end-to-end path, so one of the main functions of a PERT is to question end-users, system administrators, and network operators who have systems on that path.

Picture
Alessandra
Scicchitano,
eduPERT Task
Leader

The role of eduPERT is to help these individual PERTs come together to share knowledge, best practice and experience and help spread this information throughout the GÉANT community.

eduPERT is part of GÉANT's commitment to helping network users get the best performance from their connections.

Details of the next Performance U! school will be announced shortly. For more details and information on how to register, visit the edupert website at <http://edupert.geant.net>

EDUROAM® SUSTAINABLE TRAINING EVENT FOR RESEARCH AND EDUCATION IN SUB-SAHARAN AFRICA

Karl Meyer, Product Marketing and Communications Officer

The UbuntuNet Alliance, in collaboration with GÉANT, recently hosted a one-day eduroam® training event in Kampala, Uganda, for associates of the AfricaConnect project and UbuntuNet, its high-capacity research and education (R&E) network currently being built in Sub-Saharan Africa.

17 engineers from UbuntuNet Alliance member NRENs (National Research and Education Networks) attended so they could learn how to deploy eduroam. Two member NRENs of the UbuntuNet Alliance, KENET (Kenya) and TENET (South Africa) are already in advanced stages of planning and extending eduroam services to universities in their countries. It is hoped that the training will assist other NRENs to offer the service to their user communities in the near future so that researchers and

students can have secure, remote access, irrespective of their location.

SUSTAINABLE TRAINING

The engineers spent an intensive day learning eduroam theory, concepts and configuration, equipping them with the skills and knowledge to be able to organise their own training workshops. It is through initiatives like this that the UbuntuNet Alliance aims to fulfil its vision for AfricaConnect.

Says Valter Nordh (SUNET), GÉANT Activity Co-Leader: "I am pleased that GÉANT is supporting the UbuntuNet Alliance by creating services that will add value to the network provided by the AfricaConnect project. Offering wireless access (through eduroam) to

participants is a major milestone for Africa's NRENs. It is hoped this training will lead to further eduroam deployments across Africa and increase uptake in other service areas, further enhancing the way users benefit from the network."

GLOBAL ACCESS

From humble beginnings connecting just five countries, eduroam has built momentum to become one of the largest Wi-Fi roaming services in the world, expanding in 10 years to over 60 countries and serviced by well over 5000 locations with more being added all the time in universities, schools and libraries across the globe.

@eduroam is a registered trademark of TERENA



DANCERT - SECURING THE GÉANT NETWORK

GÉANT is at the forefront of global research, providing a platform for academics and institutions to exchange data in a reliable and secure manner. Many of the users of this network will be sending or receiving sensitive data and its security and integrity is of the upmost importance.

The responsibility of monitoring and ensuring the security of the GÉANT network falls to DANCERT, the Computer Emergency Response Team (CERT) at DANTE. This team of specialists use a layered approach to ensuring security is built into the network such as in the successful **NSHaRP** process that provides real-time incident alerts for NREN networks.

NSHaRP provides a platform for security information to be exchanged efficiently and quickly enabling a rapid response to network incidents. Reporting over 60 incidents a day results in a high state of awareness about threats to their networks amongst NSHaRP partners and ensures that DANCERT is able to

assist NRENs in dealing with attacks inside the GÉANT network and also those beyond GÉANT's borders.

DANCERT uses independent technologies to monitor, report and mitigate threats to the GÉANT network and GÉANT NRENs providing a scalable solution to cater for emerging security requirements. In this ever-changing environment, the security team performs an annual independent security review to ensure tomorrow's researchers can collaborate using a secure and fast GÉANT network.

For more information on the NSHaRP process visit

<http://www.geant.net/Network/Network-Operations/Pages/NSHaRP.aspx>



Picture
Wayne Routly,
DANTE Security
Manager



MICROSOFT LINKS TO JANET TO BOOST CLOUD ACCESS AT UK UNIVERSITIES

Karl Meyer, Product Marketing and Communications Officer

Cloud services and cloud computing offer the Research & Education sector huge opportunities to leverage best of breed facilities from global providers, to bring additional services and support to their own users. By offering cloud services across R&E networks, NRENs can leverage their investment in technology and provide value added services without the need to develop, build and support separate infrastructure.

Signaling the start of a new collaboration between public and private sector organisations, Microsoft have signed an agreement with Janet, the UK's research and education network, to deliver a speedier and more secure connection to services for students and researchers.

The agreement will see the establishment of a peering arrangement between the networks of the two organisations. This means that traffic to Microsoft services from

educational sites will not have to traverse the public internet, cutting latency and enabling a high bandwidth connection for students and researchers. The use of peering arrangements also reduces the load on the Internet gateways so improving response times for all other uses.

Oxford University chief information officer, Professor Anne Trefethen, said: "The capability afforded by Janet's peering with Microsoft's Cloud with high-bandwidth secure connections creates new opportunities for researchers and the University community as a whole."

As part of the agreement, any UK education institution can gain access to Microsoft's cloud-based Office 365 suite under standard terms and conditions negotiated by Janet. This eliminates the need for each site to negotiate individually with Microsoft – saving time and money.

Microsoft UK's director of education Steve Beswick said: "We are delighted to be working with Janet to

provide additional value-added products and services to the research and education community. We have a long-standing relationship with this sector and are looking forward to more collaborative working with Janet to grow our offering."

The move will benefit students by providing faster access to the research and education community. We have a long-standing relationship with this sector and are looking forward to more collaborative working with Janet to grow our offering."

Janet connects the UK's research and education organisations to each other, as well as to the rest of the world through links to the global internet and GÉANT. It also offers a wide range of services including cloud services and purchasing frameworks to enable its customers to meet their business needs.

To find out more about Janet cloud services, please visit:

<https://www.ja.net/products-services/janet-cloud-services>



100GBPS DELIVERED ACROSS ATLANTIC

The world's first intercontinental 100 Gbps link for research and education was successfully demonstrated at TNC2013

Following an earlier announcement (see CONNECT Issue 11) on the intention to collaborate, six of the world's leading research and education (R&E) networks (Internet2, NORDUnet, ESnet, SURFnet, CANARIE, and GÉANT) and two commercial partners (Ciena and Juniper) have demonstrated for the first time a Transatlantic 100 gigabits-per-second (Gbps or one billion bits per second) transmission link for research and education between North America and Europe during the TERENA Networking Conference 2013 (TNC2013), held in Maastricht, The Netherlands.

These demonstrations showcased emerging technologies and advanced applications for science, research and education. The 100 Gbps link, called

the Advanced North Atlantic 100G Pilot project (ANA-100G) will be used for engineering and testing the new transmission link, applications, resources, monitoring techniques and advanced technologies such as software-defined networking, for a period of 12 months after the conference.

These efforts will determine the operational requirements needed to effectively run 100 Gbps wavelengths between North America and Europe to meet the growing demand of specialised research organisations.

This first Transatlantic 100 Gbps link for R&E will advance high-end projects such as the experiments at the Large Hadron Collider in Switzerland, the ITER fusion reactor in France and similar international programs.

The 100 Gbps Transatlantic connection reflects two trends in scientific research: science is increasingly data driven with datasets from large-scale experiments at the tera-scale level, and these experiments are increasingly carried out by international collaborations in which researchers around the globe expect immediate access to the datasets.

The operation of this ultra high-speed link across the Atlantic Ocean also illustrates how the close collaboration between research and education networks and the commercial sector continues to evolve, with the on-going deployment of cutting-edge networking technologies that underpin ground-breaking, globally collaborative science and discovery.

THE EUROPEAN GRID HEADS TO SPAIN

This year the European Grid Infrastructure is holding its Technical Forum in Madrid from the 16th to the 20th of September.



The event is being hosted by IBERGRID, the organisation that represents the interests of the Spanish and Portuguese grid initiatives within EGI. Over the course of the week the participants will focus on EGI's strategic aims for 2020 while reflecting on the current achievements and the path for future developments.

One thing that sets this year's Technical Forum apart is the number of co-located events. These include:

- IBERGRID 2013, the annual meeting of the people working in grid on the Iberian peninsula
- Cloud PlugFest #10, an event promoting interoperability efforts on cloud standards-based software, services, frameworks, products and projects
- OGF39, one of the Open Grid Forum's regular meetings to meet and discuss standards in the grid arena

GlobusEUROPE2013, the European Globus Community Forum's annual meeting to foster cooperation within the European community using Globus

These will bring a diverse range of people under one roof that are all working on the technical challenges facing research communities within Europe.

The meeting is not just about grid and there will be many sessions dedicated to cloud solutions like EGI's federated cloud infrastructure, and the possible use of commercial cloud providers. The meeting is open to anyone interested in the future of e-Infrastructures in Europe and there will be many discussions on technology, policy, operations, security and much more.

You can find more information and register for the event at <http://tf2013.egi.eu>

If you can't attend the event you can follow the event and discussions on the #EGITF13 hashtag on **Twitter** and **Facebook**.

USER PRIVACY NO LONGER A CLOUDY ISSUE



TERENA investigates how a Trusted Cloud Drive could protect user privacy

As the range and capabilities of cloud services increase and they become mature technologies many become attractive to workers in the R&E community. Increasingly, students and researchers are using commercial cloud offerings, but these are not primarily designed for the needs of sensitive research data. Universities and research institutes seeking their own on-campus storage infrastructures often find they cannot interface with each other or with public services.

This need for multi-domain, secure and trusted cloud services offers NRENs an opportunity to deliver a tailored high-performance data storage infrastructure. In recognition of these opportunities, GÉANT has created a new “Cloud Services” team to investigate and maximise the benefits of cloud services.

TERENA has been at the forefront of research in this field by demonstrating how universities’ and NRENs’ personal cloud storage facilities can become trusted services that protect data privacy through TERENA’s Trusted Cloud Drive (TCD) initiative.

The community Task Force on Storage (TF-Storage), which is supported by TERENA with funding from GÉANT, provided a consultation forum for developing a TCD pilot service. This launched in April 2012. During the pilot phase the software platform was installed and tested at the TERENA Secretariat and research networks in Belgium, Brazil, Croatia, Czech Republic, Greece, Poland, Portugal, and Spain.

It is intended that TCD will not function as a complete end-user data



storage facility but instead demonstrates a lightweight privacy-protecting middleware component that could be installed at the back-end of personal data-storage applications chosen by users. This separates content from metadata before it is stored in the cloud. The metadata can be stored in a trusted place, while the content is encrypted and stored in the cloud securely and safely. In this way, the encrypted content cannot be accessed without the data owner being involved. This model addresses legal concerns highlighted by the US-EU Safe Harbor Framework, the USA Patriot Act, and the European Commission Directive on

fighting cyber-crime and protecting privacy in the cloud.

TERENA will continue to maintain and develop the TCD platform within the TF-Storage consultation. The results of this pilot will help the Cloud Services Team in planning live services across GÉANT. The final TCD pilot project report was published in May 2013 and is available as a PDF at www.terena.org/publications/. More information about the pilot can be found on <http://www.terena.org/clouddrive>.

Picture and words

Laura Durnford,
TERENA Senior
Communications
Officer

TERENA TASK FORCES – CAN YOU HELP SHAPE THE FUTURE?



Words

Laura Durnford,
TERENA Senior
Communications
Officer

Picture

Participants of
TF-Storage,
meeting in
Berlin in
March 2013

GÉANT is well known as a first-class network offering the European research and education networking community a unique range of services. However, less well known are the range of outreach and human networking activities that GÉANT supports.

In particular, the TERENA (Trans-European Research and Education Networking Association) task forces support innovation, service incubation and community building across the community. For many years, volunteers from national research and education networks (NRENs) and partners across the wider community have been working together in these open task forces. Their contribution pays enormous dividends to the project.

TERENA task forces provide a forum for exchanging ideas and expertise, exploring new concepts, tools and services, and building communities of experts with common interests and goals. They act as a vital conduit between the RTD (Research and Technology Development) work of GÉANT and experts from the wider

community in Europe and beyond. Relevant new ideas, methods or services are fed into GÉANT and are often developed further within the project.

A prime example of successful interaction between task forces and GÉANT is eduroam®. Originally an idea from a community member, this global service was developed in the task force TF-Mobility (now TF-MNM) and came under GÉANT's wing in April 2009. This task force collaborated with GÉANT to standardise the Transport Layer Security (TLS) encryption for the Remote Authentication Dial-in-User Service (RADIUS) protocol, which underpins eduroam. This was published by the IETF as RFC6614, making RADIUS more secure and scalable.

There are currently eight task forces supporting the work of TERENA and GÉANT;

- TF-MNM – (Mobility and Network Middleware)
- TF-EMC2 (European Middleware Coordination and Collaboration) – helping to coordinate developments in eduGAIN
- TF-CSIRT – (Computer Security Incident Response Teams)

- TF-NOC (Network Operation Centres)
- TF-Media - Task Force on Applied Media in Teaching and Learning
- TF-CPR (Communications and Public Relations)
- TF-MSP (Management of Service Portfolios) ensuring GÉANT participation in discussions about Community Relationship Management Systems
- TF-Storage has been active in TERENA's Trusted Cloud Drive, which is now feeding into GÉANT's new Cloud Activity.

GÉANT has been funding secretariat support and coordination of the technical task forces since September 2004. Since April 2013, these relationships have strengthened with support extended to all task forces, including the community's marketing and communications activities.

For more information about the activities of the TERENA task forces and how to join and contribute to them, visit <http://www.terena.org/activities> and click 'Filter by Task Forces'.

ASTRONOMERS BENEFIT FROM NEXPRES AND GÉANT

**NEXPReS project improves radio
astronomy techniques with GÉANT**



After three years, the ground-breaking NEXPreS project finished on 1 July 2013. NEXPreS (Novel EXplorations Pushing Robust e-VLBI Services) has successfully helped the radio astronomy community and been at the forefront of trialling new advances in research networking technology, particularly in areas such as Bandwidth on Demand (BoD).

Begun in 2010, NEXPreS aimed to improve astronomical techniques by eliminating the distinction between traditional disk-based Very Long Baseline Interferometry (VLBI) and real-time electronic VLBI (e-VLBI) techniques.

Through new data caching, network storage, cloud correlation and bandwidth on demand techniques, NEXPreS's goal was to bring together the reliability and robustness of VLBI with the speed and flexibility of e-VLBI for every observation conducted by the European VLBI Network (EVN). Funded by the European Union under the Seventh Framework Programme (RI-261525), NEXPreS was made up of 15 partner institutes in eleven countries, coordinated by the Joint Institute for VLBI in Europe (JIVE). Networking partners in the project included DANTE, NORDUnet, PSNC and SURFnet.

VLBI uses multiple radio telescopes distributed across great distances to observe the same region of sky simultaneously. Data from each telescope is recorded on hard disks and then sent to a central supercomputer to correlate results to produce high resolution images.

e-VLBI replaces disks by streaming data across research networks to the same central correlator, delivering faster results and enabling real time observations of short-lived astronomical phenomena. However e-VLBI doesn't allow for data to be re-correlated and relies on constant network connections.



Research networks such as GÉANT and its NREN partners have been a key part of the project's success. e-VLBI simply cannot be carried out without the power of research networks, as it relies on high speed, reliable connections between telescopes around Europe (and beyond) and JIVE in the Netherlands. As T. Charles Yun, NEXPreS project manager points out, long term collaboration has been vital, "It is important that R&E networks have cooperated with radio astronomy over long periods so that we can learn what technologies are coming and influence future work and participate in its development."

FIRST USE OF NSI PROTOCOL

NEXPreS has been a pioneer in using Bandwidth on Demand (BoD) and was the first project to use the new Network Services Infrastructure (NSI) protocol. NSI provides a standardised interface, allowing users to quickly and easily create interoperable BoD services across multiple research networks.

According to Paul Boven, the activity leader for NEXPreS's BoD work package, NSI is critical to setting up e-VLBI observations. "We have already used the flexibility of BoD to reroute connections over different incoming fibres, allowing us to engineer the distribution of incoming traffic over the various networking links at JIVE. But NSI is going to become much more

Words

Chris Measures,
Science Writer

important to us as e-VLBI goes to higher bandwidths, such as 4Gbps, and larger numbers of telescopes in the near future."

The success of BoD will have a lasting impact says T. Charles Yun. "BoD allows us to reserve a scarce resource, use it, and then return it to the community. This usage fits in very well with the way VLBI observations are scheduled."

PATHFINDER FOR THE SQUARE KILOMETRE ARRAY

Looking further ahead, the lessons learned from NEXPreS will inform the planned Square Kilometre Array (SKA), the world's largest and most sensitive radio telescope. Made up of thousands of linked radio wave receptors located in Australia and in Southern Africa, the SKA will create a telescope with a collecting area equivalent to about one square kilometre and will generate enormous amounts of data to be analysed and shared amongst the global astronomy community. The work of NEXPreS will act as a pathfinder project for many areas of SKA, including distributed storage and bandwidth on demand.

Through close collaboration with research networks and astronomers NEXPreS has succeeded in providing the best of both worlds – the immediacy of e-VLBI and the stability of recorded VLBI, improving our ability to study the universe around us.

OUTSTANDING RESPONSE TO GÉANT OPEN CALL

HIGH QUALITY PROPOSALS RECEIVED FROM TOP NETWORK RESEARCHERS

In April, GÉANT announced its first Open Call for Multi-Domain Network Research and Development activities. The objective was to source new and innovative users and projects to work with GÉANT, developing future innovations to help promote the unimpeded movement of scientific knowledge across high-speed networks. The Open Call attracted 70 proposals from across Europe and beyond and the European Commission budget of €3.3m was oversubscribed by a factor of three. Michael Enrico, DANTE CTO and GÉANT Technical Coordinator, GÉANT, tells us more:

"We are delighted with the response to the Open Call. With such a high over-subscription rate, it has been a huge undertaking to evaluate the proposals, and ensure we

maximise the available funding structure. The quality of applications has been very high; as you can imagine this has made the selection process incredibly tough."

"The spread of topics received has been excellent and we are particularly pleased with the interest in the SDN (Software Defined Networking) OpenFlow topic, as GÉANT has recently launched an OpenFlow test network facility; developed to support the increasing requirements from industry and academia for an experimental test-bed environment."

"We'd like to extend our thanks to our National Research and Education Network partners for assisting us in the promotion of the Open Call, which has proved a tremendous opportunity to attract new users."

The competitive evaluation process began in June with independent experts rigorously assessing the proposals. GÉANT will now enter into negotiations with a number of projects with a view to funding more than 20 projects.

The selected projects will be formally announced in October, at GÉANT's annual symposium held in Vienna. Enrico added:

"The symposium will be a great opportunity for our new colleagues to get to know the people and processes behind the GÉANT network. We very much look forward working with the Open Call projects throughout the remainder of the GN3plus project."

Open Call projects will run between October 2013 and March 2015.

GÉANT PARTNER PROFILE: SWITCH

SWITCH

As a partner of the Swiss universities, SWITCH brought the Internet to Switzerland more than 25 years ago. Today, the non-profit organisation with around 110 employees at its headquarters in Zurich develops Internet services for lecturers, researchers and students. Services SWITCH has successfully developed for the academic community are also offered to commercial customers. In addition, SWITCH is committed to ensuring the security and stability of the Internet in Switzerland.

BACKBONE

The SWITCH foundation operates its own secure, high-speed fibre-optic data network. Measuring some 2,500 km in length, the network connects over 275,000 university members at 65 research and teaching institutions with each other and with GÉANT. Over the next few years, SWITCH will upgrade the academic network to 100Gbps – a milestone in the evolution of Switzerland's university infrastructure.

CUSTOMER PREFERENCES AND SYNERGIES TAKE PRIORITY

SWITCH previously endeavoured to develop IT services for the Swiss universities that could not be found anywhere else in the marketplace. Strategy 2020 changed this at the end of 2011. The focus is now on acting as a professional solution provider and thus also standing out and making an impact in areas where there is competition from commercial providers.

Customers from the academic community can use the Innovation Engine to help them work out for themselves which services are needed. SWITCH looks at their proposals, analyses alternatives and synergies for the whole of the Swiss university system and puts them into practice

where appropriate – even if they concern standard services like spam filtering and IT procurement. Wherever shared IT services for all Swiss universities make sense, SWITCH's extensive network know-how and existing infrastructure make it the logical and most cost-efficient partner both now and for the future.

25 YEARS OF SWITCH – WHAT COMES NEXT?

At the end of the 1980s, SWITCH brought the Internet to Switzerland and became the country's very first Internet service provider. The demands of SWITCH's partners in the academic community have changed dramatically since then. These days, information supply issues are paramount. SWITCH is setting precedents with strategic discussions and pilot projects in the areas of data lifecycle management, cloud computing, e-identity, e-learning and collaboration tools that will gain worldwide importance for research and teaching in the coming years. Universities face particularly huge challenges in terms of storing, accessing, managing, archiving and disposing of the massive quantities of data generated and used in research and teaching work. SWITCH helps them to create the knowledge space they need.

Picture

Andreas Dudler, Managing Director of SWITCH, and the sculpture "Bookstorm", University of Zurich, Irchel campus.



BELNET, THE BELGIAN NATIONAL RESEARCH NETWORK PROVIDING HIGH-SPEED INTERNET CONNECTIONS TO UNIVERSITIES, COLLEGES OF HIGHER EDUCATION, RESEARCH CENTRES AND PUBLIC SERVICES, IS THIS YEAR CELEBRATING ITS 20TH ANNIVERSARY.

HAS A LOT CHANGED OVER THESE 20 YEARS?

Absolutely. In 1993 the internet was reserved for a small number of people and today it has become a commodity. In 20 years, the connectivity offered by Belnet has increased from 64Kbps to 10Gbps. We now serve 200 institutions with a total of 750,000 users.

This change, just as the need for more availability and high capacities of the internet connections, has led to much greater professionalisation. We have had to take on more staff who are more diversified and Belnet now employs over 60 people.

HOW WILL YOU CELEBRATE THIS ANNIVERSARY?

To mark our anniversary, we wish to place the institutions that are connected to our network at the centre of the event. We work for and with them and we will meet them throughout the year to prepare the future together!

All the activities carried out with our customers will culminate in the organisation of a special 20-year anniversary annual conference scheduled for December.

WHAT HAVE BEEN THE SIGNIFICANT MILESTONES?

In these 20 years, we have continually improved our network which, with each new generation, has become increasingly powerful. The next generation of our network, scheduled for 2014, will reach a capacity of 100Gbps.

For the past ten years, we have offered technologies compatible with the IPv6 protocol. Our network is now fully 'IPv6 enabled' and all the institutions connected to our network have received their own range. We share this acknowledged expertise of IPv6 by organising workshops for all our partners who wish to receive training and prepare for the changeover to IPv6. Regularly organising practical or information workshops also forms part of our main projects.

Since last year, we have also organised the Belgian Internet Security Conference, which addresses issues of strategy with respect to cyber security. We believe that it is also our role, as a public service, to invite not only the academic world but also finance, businesses and administrations to discuss strategies relating to security and threats on the internet.

Words
Laetitia Lagneau,
Head of
Marketing and
Communication
at Belnet.



THE SCHOOLS 2.0 PROJECT AWARDED THE "EUROPEAN PRIZE FOR INNOVATION IN PUBLIC ADMINISTRATION"

The Schools 2.0 Project of the Croatian Academic and Research Network - CARNet was chosen as one of the three most innovative initiatives in the category of Initiative for the Education and Research of the European Prize for Innovation in Public Administration. The aim of this project is to enable high-quality and comprehensive distance learning and e-learning for an increasing number of users – both teachers and students.

The award ceremony was held on Thursday, 6th June 2013, during the Week of Innovative Regions of Europe Conference in Cork, Ireland and the project was awarded with €100,000, to be invested in its further development.

This valuable prize was awarded by the Research, Innovation and Science Commissioner Máire Geoghegan-Quinn, who said: "Innovations are not reserved only for business. The public administration generates half of the gross domestic product of the EU and it should also be open to changes. Today, our winners have shown that we can improve our lives and contribute to the modernisation of our economies by connecting new ideas with technology. We need more initiatives of this kind."

The contest was launched by the European Commission, and the prizes were awarded to those whose innovations improve the work of public administration and who encourage others to adopt a more modern and innovative approach to work. The European Prize for Innovation in the Public Administration was awarded to nine most innovative initiatives of the European public authorities, three in each category, on the basis of four criteria: originality of initiative and the possibility of a widespread use of



Words
Goran Skvarc,
Information and
PR Coordinator,
CARNet

the same model; economic impact of the initiative on society; relevance of initiative with respect to problems with which the society is currently confronted and the use of allocated funds according to plan. More information about the contest and the winners is available at <https://goo.gl/a8N5W>.

According to the rules of the contest, the prize should ensure the further development of the Schools 2.0 project. This means that the professional training of teachers involved in the project will be continued for the purpose of improving digital competence and that there will be further investments in the development of digital maturity of the schools involved in the project, as well as further work on the project-related interconnection of schools at

Picture
Left to right:
Ms. Andrijana Prskalo Macek,
Vice CEO, CARNet
Ms. Aleksandra Mudrinic, Skole 2.0 Project manager, CARNet
Ms. Máire Geoghegan-Quinn, Research, Innovation and Science Commissioner, EU Commission

the national and international level.

As part of the project, 26 school locations will be connected to high-speed Internet via an optical network (7 main schools with corresponding branch schools). Wireless networks (including eduroam) will be set up in these schools to enable students and teachers to access online learning materials and digital textbooks via the tablet, and use them for videoconferences and distance learning. All of these schools will also be a part of the e-Class Register project.

For the project, CARNet received just under 12 million Kuna through a public tender conducted by the Croatian Post and Electronic Communications Agency - HAKOM, which will be used not only to finance the mentioned network and

videoconferencing infrastructures and connections, but also for the purchase of tablets for teachers and students, as well as any necessary teacher education aimed at improving their digital competence, specialized education for the use of technology and the planning and implementation of project-related cooperation among schools.

Schools will also be equipped with scientific learning technologies (sensors) for natural sciences - biology, chemistry, physics and ecology. The use of these sensors will encourage a collaborative and project-oriented approach to learning, considering that it is envisaged that all schools participating in the project will cooperate through various educational activities which include the use of technology in teaching. The use of sensors will incite a different and more immediate understanding of natural science subjects and nature in general and will also contribute to the digital literacy of all users.



Picture
European Award
for Innovation
in Public
Administration
Laureates

GÉANT AT TNC2013

June saw 600 members of the research and education networking community attend the annual TERENA

Networking Conference in Maastricht, the largest and most prestigious European research networking event.

Bringing together decision makers, networking specialists and managers from all major European networking and research organisations. The event offers the chance for attendees to learn about the latest technical, application and management developments in research networking.

GÉANT regularly plays an active role in TNC with an exhibition booth, and this year included three well-attended panel discussions, seven GÉANT Associated Speakers and a lively group workshop on global collaboration.

The booth included comprehensive information on GÉANT to showcase the latest technology and service developments, and a video produced with Infinera,



“2 Terabits in 12 minutes,” to highlight this exciting step for the recently upgraded network.

All visitors to the booth were given a copy of CONNECT magazine,

six new Technology Briefings, and literature from several of our partners including RedCLARA, ELCIRA, ACE, FIRE and the UbuntuNet Alliance.



PRACE SHOWCASES EUROPEAN COMPUTATIONAL SCIENCE EXCELLENCE

Now in its third year of existence, the 2013 PRACE Scientific Conference (colloquially known as “PRACE Day”), featured presentations by top European computational scientists who utilise high performance computing to perform world-leading computer simulations in their respective fields.

The conference, chaired by Professor Kenneth Ruud, president of the Norwegian Chemical Society and Chairman of the Scientific Steering Committee of PRACE, showcased nine high-achieving projects, including the UPSCALE project that received a record-breaking allocation of 144 million core hours on the Hermit supercomputer. The science talks were preceded by presentations by Konstantinos Glinos, head of the European Commission e-Infrastructure unit, who outlined the EC HPC Strategy to find solutions to societal challenges and to boost industrial competitiveness; and by Dr. Sergi Girona, Chair of the PRACE Board of Directors, who summarised

the PRACE 2.0 Strategy for a sustainable and persistent infrastructure 2015-2020.

Mr Glinos said: “Europe has the technological know-how and market size to play a leading role in all areas: HPC technologies and systems, services and applications,” a sentiment echoed by Dr. Girona, who underlined that: “one of the main elements of the PRACE 2.0 Strategy is offering access-service and support to users,” besides organising the PRACE Advanced Training Centres, facilitating access for industry and promoting new methods of access and services for SMEs.

The PRACE Scientific Conference and its accompanying PRACE ISC Award – which was this year awarded to the project “Multi trillion particles simulation on SuperMUC” by Wolfgang Eckhardt of TU München (Germany) – are just two of the many initiatives that PRACE and the PRACE IP Projects undertake to support and promote excellence in European science and research. Another example is the PRACE



Words
Marjolein
Oorsprong,
PRACE
Communications
Officer

Industrial Seminar – the fifth in the series was held in April 2013. SHAPE - SMEs HPC Adoption Programme in Europe - is PRACE’s latest offering to facilitate the uptake of HPC resources by industry. The Call for Proposals to SHAPE opened on 17 June 2013.

PRACE’s achievements were recently acknowledged with a favourable mention in the Conclusions of the 3242nd European Competitiveness Council meeting, published on 30 May 2013.



“

PRACE is proud of the recognition it has received from the Competitiveness Council for the hard work of the PRACE Association and the PRACE Implementation Phase (IP) Projects, and fully intends to go above and beyond what has been achieved until now.

”

Catherine Rivière,
Chair of the PRACE Council.

E-IRG'S WHITE PAPER 2013 PUBLISHED: EUROPE NEEDS AN E-INFRASTRUCTURE COMMONS

A 2012 e-IRG Roadmap outlined a vision for the future of e-Infrastructures in Europe. Now, the e-IRG has published its 2013 White Paper, which takes the discussion one-step further and proposes specific next steps.

To meet the challenges of implementing the 2020 Strategy, Europe needs an “eInfrastructure Commons” for knowledge, science and innovation. It should be open and accessible, and continuously adapting to the changing requirements of research and to new technological opportunities.

Available e-Infrastructure resources as well as the conditions for access vary strongly between countries. This limits the ability of universities and research institutes to collaborate with each other and with commercial researchers. Therefore, there is an urgent need for a European “e-Infrastructure Commons”: a flexible and dynamic ecosystem, providing integrated services through interoperable infrastructures.

A centrally managed e-Infrastructure is not a solution. Instead, there is a need for a joint

strategic effort involving users, providers, and funding agencies, leading to a high degree of coordination without stifling innovation. The e-IRG White Paper 2013 outlines a number of steps towards this objective. These steps focus mainly on changes in organisation, governance and funding; an important element is the empowerment of end-users through changes in funding mechanisms.

The White Paper 2013 was based on contributions by various e-IRG champions, all experts in different areas. In order to keep the White Paper sufficiently concise, the original contributions were strongly condensed. However, a much longer version of the White Paper will remain available from the e-IRG website, including all of these contributions. The comments from a consultation on an earlier draft are also available on the website, in order to facilitate an open and transparent discussion.

The e-IRG White Paper 2013, the long version of the White Paper, and the comments can all be found here:

<http://www.e-irg.eu/publications/white-papers.html>

Words

Ari Turunen,
Communications
Manager,
Cloud Software
Program



GLOBAL NEWS

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

AFRICACONNECT AWARDS CONNECTIVITY CONTRACT

DANTE has awarded a 15-year contract to award-winning carrier WIOCC for connectivity services in Southern and Eastern Africa. The award was made at the end of a two-year planning and procurement phase for the AfricaConnect project. In 2015, the contract will novate from DANTE to the UbuntuNet Alliance.

The connectivity procured under the AfricaConnect project complements the UbuntuNet network, a high-capacity network for research and education in Sub-Saharan Africa which creates a regional gateway for global research collaboration. Whilst the long-awaited internet backbone

will improve the lives of millions of Africans through accelerated research and education, the connectivity will equally benefit collaborative scientific research the world over, in areas such as climate change, malaria, biodiversity and medicine.

Africa is a rich resource of intellect and genetic resources, as well as having the sort of large quiet spaces ideal for deep space research, and its increased involvement in global science is highly anticipated.

A comprehensive procurement process began in October 2011. Ten organisations from Africa and Europe

submitted tenders, and after a competitive negotiation process, the final shortlist comprised five potential suppliers.

WIOCC will provide high-speed data transmission capacity between a set of Sub-Saharan Africa locations and Europe, along with housing space for UbuntuNet routing, switching and monitoring equipment. The new links are expected to be operational in the second half of 2013.

For more information on AfricaConnect, visit:

<http://www.africaconnect.eu/Pages/home.aspx>



ELCIRA COMPLETES BUSY FIRST YEAR



At the end of May 2013, the ELCIRA (Europe Latin America Collaborative e-Infrastructure for Research Activities) Project reached the end of the first year of its 24-month duration. Led by the Latin American R&E networking organisation, RedCLARA, and partnered by the NRENs of Brazil (RNP) and Colombia (RENATA) in Latin America, and DANTE, TERENA, GARR and RedIRIS in Europe, ELCIRA aims to enhance collaboration between Europe and Latin America. This work is being carried out by a number of Work Packages which focus on the areas such as extending Identify Federations in Latin America; videoconferencing directories and dialling systems; promoting the deployment of eduroam® in Latin America; providing collaboration tools to enable research project participants to work together more effectively; and foster collaboration between European and Latin American researchers.

The successes of ELCIRA participants since the beginning of June 2013 include the following:

- In addition to the Brazilian Identity Federation, CAFé, which was established before the start of ELCIRA, and is already a member of eduGAIN, the Chilean Federation COFRe is already in the process of joining eduGAIN. In Peru a pilot

federation now exists and federations are also emerging in Argentina, Colombia, Costa Rica and Mexico.

- Agreements have been made by the GÉANT eduCONF team and the RedCLARA SIVIC team to bring the two services closer together, by having a common videoconference facility certification process, an integrated directory of VC facilities and an integrated dialling system. Another area that is being explored is the possibility of a federated support system.

- The first meeting of the ELCIRA team held in Lima, Peru, in July 2009, was a catalyst for the establishment of eduroam by the Peruvian NREN, RAAP. To date, eduroam is also available in Brazil and Chile, and in Mexico, eduroam is in the deployment phase. Three other countries (Argentina, Colombia and Costa Rica) have eduroam Candidate status.

- ELCIRA has agreed on a suite of tools to be made available to research groups to make their collaboration more effective. The tools consist of web-conferencing (using MCONF developed by RNP), a wiki tool, a collaboration platform and a large file transfer tool. A tools portal has been developed and is currently in a pilot stage which allows NRENs in Latin America and Europe to make the tools available to user communities in their respective countries.

- By creating a database of FP7-funded projects involving participants from Latin America, together with a tool to visualise this information, ELCIRA has developed a method of easily identifying Europe-Latin America research projects which could benefit from other services offered through ELCIRA. Work has also focused on providing InfoDays which provide information to interested groups on European Commission funding opportunities. The InfoDays have been made possible through a blueprint also developed by ELCIRA to implement large-scale intercontinental videoconferences. Finally, a video tutorial has been created to show users how to use the services developed by ELCIRA.

The ELCIRA successes on eduGAIN and videoconferencing have relied on close collaboration between the ELCIRA project and the GÉANT eduGAIN and eduCONF services. A commitment to continue this collaboration was formalised at the Maastricht TERENA Networking Conference in June 2013 where Memorandums of Understanding between ELCIRA and eduGAIN on the one hand, and eduCONF on the other, were signed.

For more information on ELCIRA, visit: <http://www.elcira.eu/>.



DANTE AND NSRC TEAM UP TO NARROW THE GLOBAL DIGITAL DIVIDE

"We are very excited to work with NSRC, as it is a truly global facilitator for R&E networking in emerging regions. Both DANTE and NSRC are driven by the same philosophy: our activities are not just about computers and routers, but also about people and human networks that develop and use the connectivity. I have seen Steve and his team in action in Africa and Latin America. I now look forward to this inspiring team work in other parts of the world in support of research and education at the margins."

Cathrin Stöver, Chief International Relations and Communications Officer at DANTE

MoU signed to formalise cooperation in support of connecting the least connected

Networking organisation DANTE and the Network Startup Resource Centre (NSRC) - two of the world's leading agencies responsible for developing and connecting national research and education networks (NRENs) around the world - have signed a partnership agreement to formalise and further develop their collaboration across the globe. This new step in their longstanding working relationship has been welcomed with great enthusiasm by both parties and is expected to lead to an expansion of their joint activities to give a helping hand to the many NRENs being set up in emerging

regions such as Sub-Saharan Africa, South East Asia and Central Asia.

This is an opportune time to leverage the numerous investments happening in the global R&E network fabric. We are delighted to work more closely with DANTE and numerous regional partners around the world to enhance the substantial contributions by the European Commission to improve network connectivity and infrastructure. In working together more closely, I believe we can more effectively support our international colleagues with their activities to build affordable, sustainable university networks and R&E networks.

Words
Steven Huter,
Director of the
NSRC

Read the full
story here:
[www.geant.net/
DANTE_and_
NSRC_team_up](http://www.geant.net/DANTE_and_NSRC_team_up)

To find out more about DANTE visit www.dante.net and click [here](#) to get an overview of the DANTE's global connectivity involvement.

To find out more about NSRC visit www.nsrc.org

You can follow Steve and NSRC's activities around the world at <http://www.nsrc.org/where/>

AFGHANISTAN'S UNIVERSITIES ACCELERATE ON THE VIRTUAL SILK ROAD

Despite the media spotlight on the progress and challenges of the peace process and reconstruction in Afghanistan, a series of Internet network initiatives are quietly underway that are transforming education and research within the country.

Jointly funded by NATO's Science for Peace and Security Programme and the U.S. Department of State, currently 18 universities are connected through the SILK-Afghanistan project and will benefit further from a national fibre optic network programme currently under construction. A new organisation, AfgREN, is being set up to manage a dedicated NREN for the country, a model successfully proven around the world.

Further initiatives have recently been announced which will increase Afghanistan's links with the global

research and education community. Connection capacity to GÉANT is to be increased from 75 Mbps to 155 Mbps, with Internet traffic between Kabul and the Vienna hub running solely on terrestrial fibre optic networks, connecting an estimated 70,000 Afghan students, teachers and researchers with GÉANT's 50 million users at 10,000 institutions across Europe. 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.

The new initiatives mean that Afghan scholars will be able to gain qualifications through multimedia-based distance learning while researchers can work on international projects, all without needing to leave their home country to pursue their

work. Collaborative global projects in areas such as crop research and disaster relief can improve living standards by bringing together expertise from around the world with local specialists on the ground. As well as these vital programmes for economic and societal development, Afghanistan's unique cultural heritage will be also safeguarded through international collaborations, including musical concerts and dance performances shared around the world through real-time video and audio links.

Minimising the brain drain of qualified citizens will be central to efforts to rebuild the country, and R&E networking can play a vital role in that.

To find out more about the SILK-Afghanistan project, visit

http://www.nato.int/cps/en/natolive/topics_53359.htm





INTERVIEW: FRANCIS LEE, SINGAREN AND TEIN*CC

Professor Bu Sung (Francis Lee) is a key figure on the R&E networking scene in Asia Pacific. Not only has he been instrumental in setting up SingAREN, the NREN in Singapore, but he has also been a pioneer for the TEIN network (www.tein.net). Prof. Lee is the founding Chair of Governors of TEIN*Co-operation Center (TEIN*CC), a non-profit-organisation in Korea that took over TEIN network management from DANTE in 2012.

LOOKING BACK OVER THE LAST 10 YEARS, WHAT WERE THE GREATEST CHALLENGES YOU AS A LEADER OF A NATIONAL AND REGIONAL R&E NETWORK HAD TO FACE?

In the case of SingAREN, it was the building of a sustainable business model to move the project from being funded directly by the government to a not for profit society. We were lucky that members were willing to step forward and materialise the formation of the society and accepted the business model.

At the regional level, the diversity of culture and needs of the different NRENs is the biggest challenge. Each NREN has their own needs, and bringing them together to share a common vision and working together for the community takes a lot of effort and trust. In the case of TEIN, it has now gone one step further to take over the ownership of running the TEIN4 project.

WHAT DOES THE USER COMMUNITY IN SINGAPORE ASSOCIATE WITH SINGAREN?

SingAREN is a high-speed and efficient global network for the

research and education community. However, there are still a lot of end users who do not realise that they are using our network. This means that we are doing a good job. However, we are doing promotion activities, e.g. case studies to highlight how users are being well served and to encourage others to also use the network more effectively for their research.

HOW HAS TEIN BENEFITTED THE ASIA PACIFIC REGION?

Prior to the TEIN project we had a number of links in the regions, however it was mainly based on bilateral agreements.

With the TEIN project the network is a community network. We all share/own the network. It compliments existing links and thus form a much more pervasive and resilient network in the region and between region. In terms of economic benefit, I saw a major drop in the international link cost due to the aggregated link tender. In terms of network engineering more optimised path between NRENs. On top of this it has also enabled greater collaboration within the region and with researchers across the globe.

Picture
Francis Lee,
SingAREN
and TEIN*CC

NOW THAT MANAGEMENT FOR THE TEIN NETWORK HAS BEEN TRANSFERRED TO TEIN*CC, WHAT ARE THE MAJOR CHALLENGES AND OPPORTUNITIES AHEAD?

I have to thank David West (DANTE) for the professionalism and his understanding of the cultural difference in managing the TEIN project. Now TEIN*CC has been formed and the TEIN network and project has been transferred to them, again I have to thank the Korean government for coming forward to host the society.

I think the biggest challenge is to do as good a job as David has done in his efficiency and professionalism. The challenge would be to make our community take a bigger role in the running of the TEIN project.

LOOKING AHEAD, HOW DO YOU SEE THE GLOBAL R&E NETWORKING COMMUNITY DEVELOPING, WHAT WOULD BE YOUR IDEAL SCENARIO?

With globalisation, there is an ever greater need for NRENs around the globe to work more closely with each other. End users are now global researchers; we have to enable researchers to carry out their research on a global scale. Federated services are certainly needed and this would need the NRENs to work together more closely.

However, we must not forget NRENs which are only at the early stage of development and understand their needs.

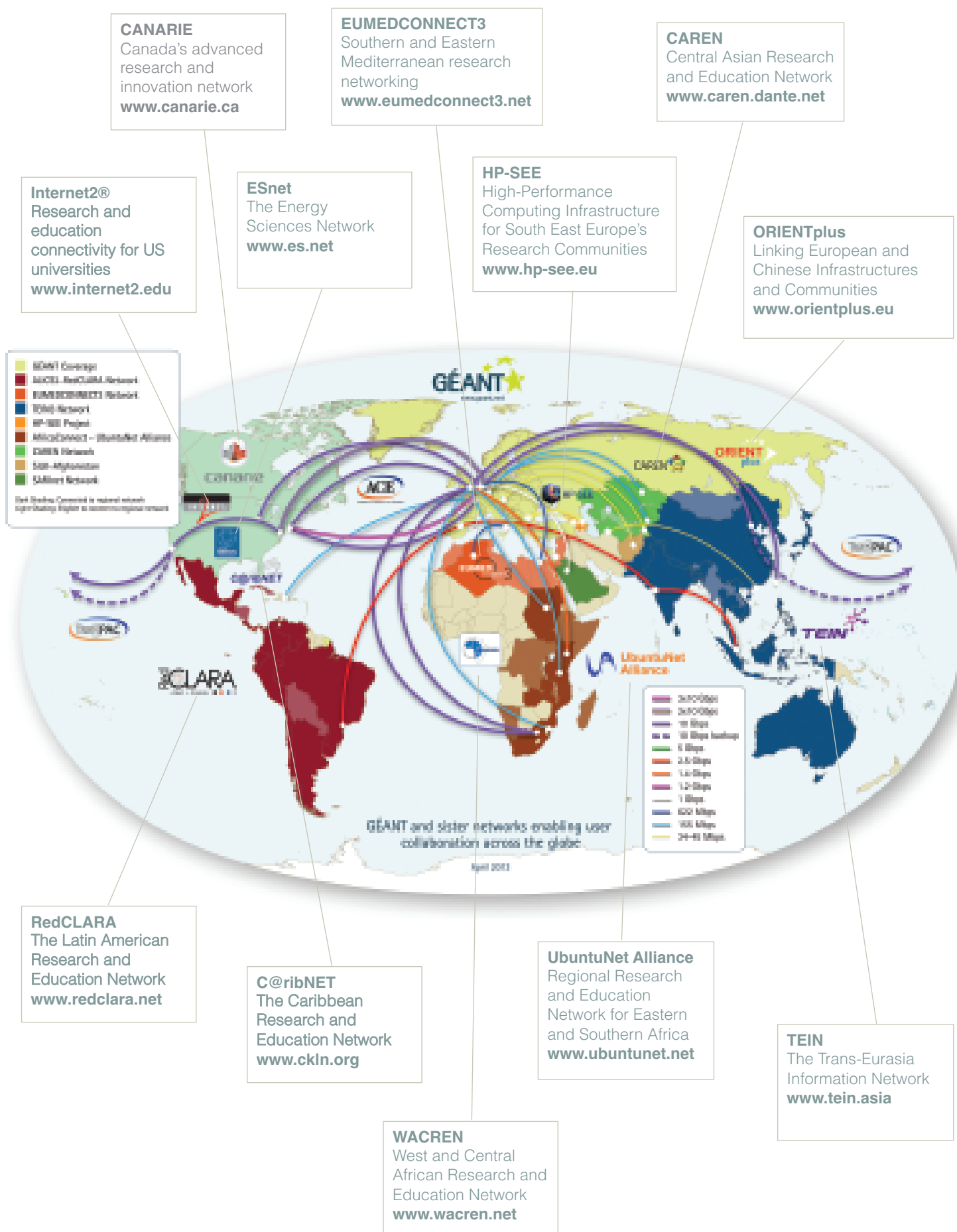
The ideal scenario would be one where there is a pervasive network: with efficient connectivity, federated services where data are collected in one country - transferred to another country for computation - and visualised in another country where it is needed seamlessly.

WHAT WAS YOUR FIRST (CAREER) JOB?

I have been an academic at Nanyang Technological University, Singapore since I graduated from Loughborough University. July 2010 till 2012, I held a joint appointment as founding Director of Service Platform Lab., HP Labs Singapore.

WHAT LED YOU TO R&E NETWORKING?

My own personal research is in the area of computer network protocols. Thus, when a friend asked me to join SingAREN at the very early stage I said yes. I've never looked back since then. It is the community and the sense of making things happen that really excite me.

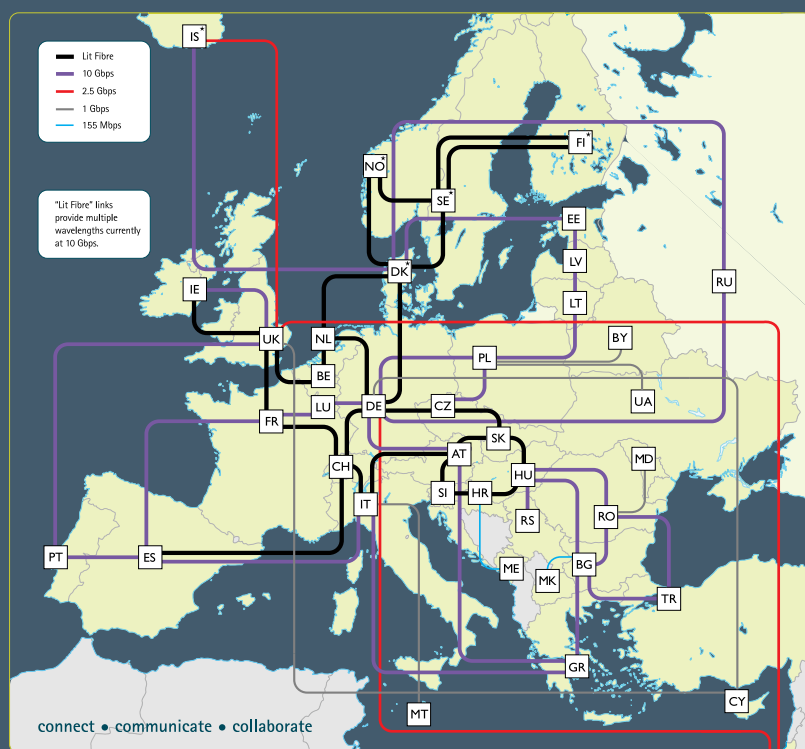


GÉANT is the pan-European research and education network that interconnects Europe's National Research and Education Networks (NRENs). Together we connect over 50 million users at 10,000 institutions across Europe, supporting research in areas such as energy, the environment, space and medicine.


www.geant.net

www.twitter.com/GEANTnews

www.facebook.com/GEANTnetwork

www.youtube.com/GEANTtv


Backbone topology as at March 2012. GÉANT is operated by DANTE on behalf of Europe's NRENs.



GÉANT Partners

ACONet
www.aco.net

Belnet
www.belnet.be

BREN
www.bren.bg

CARNet
www.carnet.hr

CyNET
www.cynet.ac.cy

CESNET
www.ces.net

EENet
www.eenet.ee

RENATER
www.renater.fr

DFN
www.dfn.de

GRNET
www.grnet.gr

NIIF
www.niif.hu

HEAnet
www.heanet.ie

IUCC
www.iucc.ac.il

GARR
www.garr.it

SigmaNet
www.sigmanet.lv

LITNET
www.litnet.lt

RESTENA
www.restena.lu

MARNet
www.marnet.mk

University of Malta
www.um.edu.mt

MREN
www.mren.ac.me

SURFnet
www.surfnet.nl

NORDUnet
www.nordunet.no

PSNC
www.man.poznan.pl

FCCN
www.fccn.pt

RoEduNet
www.nren.ro

eARENA
www.e-arena.ru

AMRES
www.amres.ac.rs

SANET
www.sanet.sk

ARNES
www.arnes.si

RedIRIS
www.rediris.es

SWITCH
www.switch.ch

ULAKBIM
www.ulakbim.gov.tr

JANET
www.ja.net

DANTE
www.dante.net

TERENA
www.terena.org

BASNET
www.bas-net.by

RENAM
www.renam.md

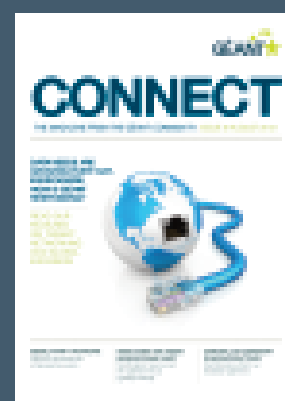
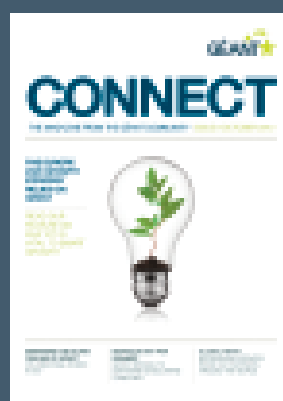
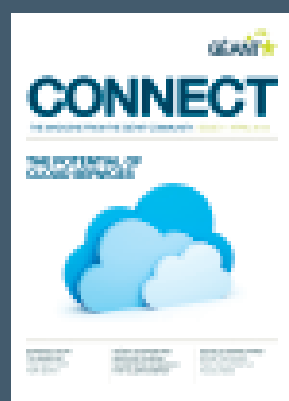
URAN
www.uran.net.ua

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