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CONNECT

THE MAGAZINE FROM THE GÉANT COMMUNITY | ISSUE 29 2018

ALSO IN THIS ISSUE

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BRINGING R&E NETWORKING TO ECUADOR

EDUROAM:
LOOKING FORWARD TO THE NEXT TEN YEARS

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CONNECT is the quarterly magazine from the GÉANT community; highlighting the activities of Europe's leading collaboration on e-infrastructure and services for 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 **paul.maurice@geant.org**

Published by GÉANT. | **Editor**: Paul Maurice

This magazine is produced as part of the GÉANT Specific Grant Agreement GN4-2 (No. 731122), that has received funding from the European Union's 2020 research and innovation programme under the GÉANT2020 Framework Partnership Agreement (No. 653998).

In addition to GN4-2, the following projects mentioned throughout the magazine have received funding from the European Union: AfricaConnect2, CAREN3, and Asi@Connect (DG DEVCO) and EaPConnect and EUMEDCONNECT3 (DG NEAR).

Hyperlinks: CONNECT is produced as a digital magazine and also made available in print. To view the digital version and benefit from hyperlinks to further information, please see: **http://connect.geant.org**

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WELCOME FROM CATHRIN STÖVER

What exactly is the impact of Brexit on GÉANT? This is a question many in our wider community have been asking us over the last year. We are happy to give our readers some very concrete answers in our interview with the GÉANT CFO, David Wrathmall. Read how we got our organisation ready to ensure continuity and smooth operations for the years to come on pages 14-15.

Other interviews in this edition of CONNECT highlight the NRENs in Kenya and Colombia. Prof. Meoli Kashorda, CEO of KENET, is of course also one of our key note speakers at TNC18. Read up on the background to his speech on pages 10-11. Luz Miriam Diaz speaks about the Colombian NREN, RENATA, and its role in Colombia on pages 60-61.

But of course, this is an edition full of TNC18 – from key note highlights, interviews, background on the eduroam Visitor Access we make available during the conference, to GÉANT´s Future Talent Programme and our Emerging NREN Programme. Please ensure to welcome our 15 student participants and our 18 participants from newly established NRENs from around the world. We are so proud to have you with us in Trondheim these days!

And let me add my congratulations to this year´s GÉANT Community Award Winner, Andres, and the Winners of the Vietsch Foundation Medal of Honour, Licia and Ingrid. Thank You for your many years of contribution and commitment to our community and enjoy the celebrations at TNC18!

Cathrin Stöver, GÉANT

tnc18 Trondheim, Norway 10 -14 June 2018
Intelligent networks, cool edges?

GÉANT

WELCOME TO TNC18 – INTELLIGENT NETWORKS, COOL EDGES?

Through keynote speeches by renowned specialists, varying parallel sessions, demonstrations and presentations, TNC presents participants with a unique overview of the latest developments in research networking, both in the technical field and in the area of application and management.

TNC is the largest and most prestigious European research networking conference, with more than 700 participants attending this annual event. It brings together decision makers, managers, networking and collaboration specialists, plus identity and access management experts from all major European networking and research organisations, universities, worldwide sister institutions, as well as many industry representatives.

Trondheim

TNC18, in its 34th edition, is hosted by Uninett, Norway's National Research and Education Network and will be held in the beautiful city of Trondheim, the tech capital of Norway. This year's prestigious keynote speakers are (in order of appearance):

MARIE MOE

Research Scientist at SINTEF ICT and Associate Professor at the Norwegian University of Science and Technology.

HELGE STRANDEN

Senior Advisor on ICT and HPC physical infrastructure at Uninett, Norway.

MEOLI KASHORDA

Chief Executive Officer of Kenya Education Network (KENET) and Professor of information systems at United States International University - Africa (USIU), Kenya.

ALEXANDRA BECH GJØRV

President and CEO of SINTEF, Norway.

ANDREW WOODS

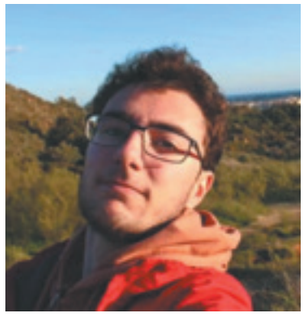
Senior Research Fellow at Curtin University, Western Australia.

UNINETT

About Uninett

Uninett runs and develops Norway's research and education network, connecting more than 300,000 users across the country. Uninett is a non-profit organisation owned by the Norwegian Ministry of Education and Research, it's located at the Teknobyen Innovation Centre in the city of Trondheim. All public Norwegian universities and colleges are connected to Uninett, along with public and private science institutes and university hospitals.

FUTURE TALENT PROGRAMME FOR YOUNG PROFESSIONALS



Photos
Left; Ilaria Bortolotti, Università di Roma La Sapienza/ GARR, Italy

Middle; Jorge Mendes, UTAD, Universidade de Trás os Montes e Alto Douro/ FCT/FCCN, Portugal

Bottom; Melchor Alejo Garau Madrigal, University of Málaga/ RedIRIS, Spain

TNC18 Welcomes a New Generation of IT Students

What better event than TNC to introduce future innovators to our community? This year GÉANT's Future Talent Programme (FTP) continues, in close collaboration with NRENs, to enable IT students to take centre stage at TNC18. 15 bright IT students were nominated by eight European NRENs to submit their best ideas and follow a training course, provided by GÉANT Learning and Development (GLAD), to prepare for the great occasion.

Nominations and support from NRENs

This year an increased number of NRENs embraced the FTP and fully supported their students' quest for TNC18. The selected students were given the opportunity to participate in the Lightning Talk Challenge or in the Poster Pursuit. Both initiatives, aimed at offering finalists the opportunity to experience TNC for the first time and introducing them to the international R&E community. The TNC18 Programme Committee was impressed with the calibre of all nominations and topics submitted by the following European NRENs: AMRES, BELNET, FCT FCCN, SWITCH, GARR, RedIRIS, RESTENA and SURFnet.

Trained and coached by professionals

All candidates were trained via e-workshops by professional coaches and community experts. Nadia Sluer, Technical Training Coordinator for GÉANT, said: "The e-workshops are a fundamental and mandatory part of the programme; their aim is not only to boost the confidence of finalists, but also to equip all future talents with the soft skills needed in their future careers."

Up-skilling Europe's IT workforce: GÉANT Future Talent Programme

Irina Mikhailava, Head of GÉANT Learning and Development (GLAD) explains: "At GÉANT, we believe it is crucial to engage, foster and develop future IT professionals. This sentiment holds true now, more than ever, as the sector undergoes a period of considerable growth. We set up the GÉANT Future Talent Programme to demonstrate our commitment in the up-skilling of Europe's future IT workforce. The FTP is the gateway for young professionals to the European and global networking community. It offers them an opportunity to grow and develop their skills through free webinar series. Furthermore, it rewards learning by offering free admission to prestigious international events to those individuals whose work is recognised by an independent panel."

The GLAD team designs and executes the programme and provides coaching and learning to talents across the community with engaging activities that are additional to their academic studies.

This approach enables NRENs to play a major role in developing young people's skills and inspire their fresh thinking. By participating in the FTP, NRENs can strengthen relationships with their member institutions, motivate high quality students and get them excited about their work with stimulating opportunities to look forward to.

FTP at TNC18:

- 5 Student Lightning Talks accepted
- 4 Student posters accepted
- 9 New topics proposed
- Student lightning talks: 11 and 12 June.
- Poster presentations: 11, 12 and 13 June - during the afternoon breaks

Topics

Lightning Talks

Hey network, what's going on? - Virtual assistants for networks
Rüdiger Birkner, ETH Zurich/ SWITCH, Switzerland

Back to the future: let's bring schools to XXI century!
Ilaria Bortolotti, Università di Roma La Sapienza/GARR, Italy

Efficiency is the way to go: get to know Enki
José Pedro Guerra Brito, Universidade de Tás os Montes e Alto Douro / FCT/FCCN, Portugal

Empowering student involvement in campus network deployment
Antonio Angel Cruzado Castillo, University of Málaga / RedIRIS, Spain

mySense - AI and Big Data for agroforestry applications
Jorge Mendes, UTAD, Universidade de Trás os Montes e Alto Douro / FCT/FCCN, Portugal

Posters

V-Labs: autonomous provisioning of virtual environments using PaaS approach
Simone Feretti, INFN Sezione di Roma Tor Vergata / GARR, Italy

SCOReS: A dynamic cache system for e-Science applications
Davide Michelino, Università di Napoli Federico II - INFN Sezione di Napoli/ GARR, Italy

Network installation upgrade, done with students?
Melchor Alejo Garau Madrigal, University of Málaga / RedIRIS, Spain

Privacy-Friendly Threat Detection Using DNS
Gijs Rijnders, Eindhoven University of Technology / SURFnet, Netherlands

FTP e-workshops
To help students prepare for TNC18 submission, GLAD organised the following FREE live webinar series

Public Speaking Skills
Trainer and coach: Barbara Rogoski, Succesfulspeakernow

Visualisation Skills
Trainer and coach: Lennaert Jonkers, DevelopMinded

The content of this course has also been made available as free e-learning material at the GEANT e-Academy at **https://e-academy.geant.org/moodle/**

GÉANT EMERGING NREN PROGRAMME - ENRICHING THE COMMUNITY

This year TNC witnesses the launch of the Emerging NREN Programme, a new initiative by GÉANT - modelled on a similar successful initiative carried out by NORDUnet in the last few years - aimed at bringing professionals from European and global emerging NRENs to TNC18 and integrating them into the vibrant international R&E community.

Emerging NRENs from around the world were invited to nominate representatives to take part in the programme: 10 female and 8 male participants from 18 organisations in 16 countries were successfully selected to attend TNC18. Veronika Di Luna, International Relations Officer for GÉANT, highlights the salient elements of this initiative:

"The programme's objectives are simple and straightforward: to integrate global Emerging NRENs into the TNC community, to encourage participation from field operatives in preference to senior management and, in particular, to stimulate new synergies and stronger connections between individuals across different organisations and organisational levels.

Every participant has been paired with GÉANT or NREN personnel according to common professional interests to facilitate relationship building. We actively encouraged submissions of Lightning Talk proposals, provided specific assistance and coaching throughout the process and, were thrilled to learn that 4 Lightning Talks, all presented by female participants from Africa, made it through to the Lightning Talks Plenaries.

We are pleased with the uptake of this programme and hope that the community will reap the benefits of future stimulating collaborations generated by initiatives like this."

Photo
Veronika Di Luna, International Relations Officer, GÉANT

GÉANT COMMUNITY AWARD 2018: A UNANIMOUS DECISION

One winner and one category triumphed at the 2018 GÉANT Community Award; this year's awards panel had no hesitation in selecting the successful nominee in the category 'impactful contributors to the GÉANT project or wider community activities over a sustained period of time': the decision was unanimous.

Andres Steijaert (SURFnet) was honoured for his contribution to research and education networking, but specifically 'for perseverance and dedication in the work undertaken to bring cloud offerings to the GÉANT community'. The award was presented on Monday 11th June, during TNC18's opening plenary session, in Trondheim, Norway.

About Andres Steijaert

Andres Steijaert from SURFnet is cloud activity leader in GÉANT. He coordinates the cloud collaboration of the European NRENs in GÉANT, to make clouds safe and easy to use. The NRENs share expertise and resources, align roadmaps and jointly engage the market. The GÉANT cloud team works on business processes for service delivery and adoption, does joint procurements to establish favourable conditions of use and provides an underlying infrastructure that links cloud services to the identity management and network capabilities of GÉANT and the NRENs. Andres is also a frequent speaker, nationally and internationally on cloud computing.

Andres said: " Receiving the GEANT Community award is a big surprise. I am honoured and grateful, especially because this award shows the appreciation from the community. That means a lot to me. Working together with colleagues from GÉANT and the NRENs is a pleasure. I am proud that through our collaboration we can make an impact and help research and education use cloud services in a safe and easy manner. For me, the GÉANT Community Award is an encouragement to continue these joint efforts. Thank you!"

Photo
Andres Steijaert, SURFnet

The following words, which summarise the reasons behind the nominations submitted in favour of Andres, are a heartfelt testament and recognition of the vital role that he has played, and continues to play, within the European NREN community.

Inspiring nominations

Andres has been the driving force behind the innovative cloud services activity for many years. It is time to recognise his perseverance and dedication to the work he has undertaken to bring cloud offerings to our community. With limitless optimism and energy, but also great organising and negotiating skills, Andres has driven the cloud project from a first idea to the current state.

The cloud initiative has spanned many GÉANT project phases, it has been a long journey that is now starting to see the fruits of all the work, which was specifically praised at the most recent EC review, and the benefits of this new procurement tool to the NRENs' user communities. Andres should be commended for at all times remaining committed and professional to achieving the vision, he's been the ideal person for the role. He values and welcomes the contributions from all who are able to provide resource and has overseen and managed successfully the transition between individuals and teams through the phases of the project.

Ingrid Melve, on behalf of the award panel, commented: "With his persistence, ability and consistent effort, Andres has changed the way NRENs collaborate and has harmoniously brought the community together".

More about the Community Award

With the Community Award, GÉANT honours people who have contributed significant ideas, time and expertise to the development of the research and education networking community's collaborative achievements. This year's panel of judges comprised: Valter Nordh, chair of the GÉANT Community Committee, Christian Grimm, chair of the GÉANT Board of Directors, Ingrid Melve, host of TNC18 and chair of the Programme Committee, and Tor Holmen, interim CEO for Uninett.

THE VIETSCH FOUNDATION'S AWARD: MEDAL OF HONOUR

TNC18 will be the stage for the award of the respected Medal of Honour by the Vietsch Foundation.

The Vietsch Foundation was officially established on 28 February 2014 by the will of the late Karel Willem Vietsch, former Secretary General of TERENA. As a charity (ANBI) under Dutch law, the foundation is capable of making and receiving grants that satisfy the objectives and purpose of the organisation: to support research and development of advanced internet technology for scientific research and higher education. The Board of Trustees of the Vietsch Foundation are the custodians of the foundation assets and core values and implement them by funding initiatives and projects that have the greatest potential impact with minimal cost.

The grants are provided for projects developing innovative technologies, services or approaches that enhance the use of internet technology in support of research and higher education, but also for original studies and reports that will inform the more effective use of internet technologies in research and higher education. Finally, funding may also be provided to assist in the preparation of bids to other funding bodies for projects in the foundation's areas of interest.

Photos
Top right; Ingrid Melve, Unit

Bottom right; Licia Florio, GÉANT

About the Medal of Honour

The Vietsch Foundation awards every year a Medal of Honour to people who, through their career, have contributed to achievements of great value for research and education in a sustainable and lasting way. This year's winners are two influential, valued and active members of the European R&E community: Licia Florio (GÉANT) and Ingrid Melve (Unit, Norway).

Ingrid Melve

For more than 20 years, Ingrid Melve has led the introduction of new technologies into research and education, bringing a practical perspective to sometimes arcane technical discussions. After early investigations into how universities could make effective use of web caches, she worked on national and international deployments of federated access management. She then led the first effort by any European research network to help universities and colleges with their internal infrastructure, covering video-conferencing, lecture capture, on-line examinations and much more. Throughout her career, Ingrid has been generous in sharing her knowledge with the community, entertaining and informing audiences at many TERENA and GÉANT conferences, as well as contributing greatly to conference organisation.

Ingrid said: "Receiving the Vietsch award is an honour. I would like to thank the Norwegian universities for their commitment to innovate digital practices; and Uninett, the research network capable and willing to support innovation. I believe in the power of small things, and practical solutions. Our community is relentlessly collaborating to make, share and practise digital solutions for education and research."

Licia Florio

Licia Florio joined TERENA in 2001. Working in the area of Trust and Identity she has led or guided most of the initiatives that make up the current European and global Authentication and Authorisation Infrastructure for R&E. Having supported the Task Forces that produced the eduroam (federated access to wireless networks) pilot and led to the technical infrastructure for eduGAIN (federated authentication system), she initiated the EuroCAMP workshops.

Licia led the TERENA Certificate Service which has greatly reduced the price of digital certificates for R&E organisations across Europe, and the TACAR project which facilitates trust between certificates issued for R&E purposes across the globe. Such activities require coordination beyond Europe and she has provided continuing leadership throughout the life of the REFEDS activity developing compatible federation policies and practices.

Currently Licia leads the AARC project which continues to help research organisations to deploy federated access.

Licia said: "It's a great honour to receive this medal. It means a lot to me as I had the pleasure to work with Karel Vietsch for many years. I'm grateful to Karel for the many things he taught me and for his constructive criticism."

INTERVIEW WITH

PROF. MEOLI KASHORDA, CEO OF KENET

Meoli Kashorda is a champion of African R&E networking. He became CEO of the Kenyan NREN, KENET, in 2008 and served as a member of the Board of the UbuntuNet Alliance from 2008 - 2016. The Kenyan NREN is based in the heart of the thriving East African telecommunications market, in Nairobi. We caught up with Prof. Kashorda before he travelled to join TNC18 in Trondheim as a key note speaker (Tuesday Plenary 11-12:30).

Meoli, the theme of this year's TNC is "Intelligent networks, cool edges?" – how would you describe KENET's cool edges these days?

In Kenya, we have cool edges in the geographic reach, where KENET reaches remote sites via radio technology. Let me give you the example of the Broglio Space Center, located 35km from the coastal town of Malindi.

The centre has been operated jointly by the Italian Space Agency and the University of Rome since the early 1960s with partnerships with the University of Nairobi and the Kenya Space Secretariat. The centre, which also operates as a fully-fledged remote sensing station, was originally connected via satellite links only. The challenge was to upgrade this site to broadband terrestrial capacity.

We initially connected the centre using last mile Wi-Fi radio provided by one of the mobile operators. This did not work well for the stable data-link required. Five years on, the fibre capacity was extended to reach Broglio and we lit the fibre at 1 Gb/s.

We are also proud to be able to connect other remote research centres and stations working mainly in the areas of public health, HIV and tropical medicine located in Western Kenya, mainly using last mile radio solutions. These centres are mainly in areas not covered by commercial operators and we often need to construct radio masts.

These research centres collaborate with other centres in Europe and North America. Our links therefore enable the research data collection in these remote areas and reliably transport it to other labs in Kenya and collaborating centres in other parts of the world.

You have often discussed the challenges of R&E networks on the African continent. KENET is a long-standing success, what are the success factors for an NREN these days?

Thank you for using the word success! But we look at ourselves as being sustainable and we are proud to have been sustainable for the last five years. KENET is a relatively old NREN compared to other African NRENs. We were founded in 2000, but then had a second start in 2008. That is when we received Kenya government funding to expand our national network, data centre and international links to Europe. That started our journey to sustainability, because since then we can offer our member institutions high quality and uncongested connectivity and community cloud services.

In KENET, we have understood that the Kenyan government and our member institutions require us to have the capacity to execute connectivity projects. That means that we have to have a critical mass of talented engineers. This talent is also needed when we are dealing with our many and helpful international partners. Any NREN needs to build its capacity to execute technical projects and the capacity to absorb help from collaborating partners.

Our engineering talent allows us to provide direct engineering support to increase the e-readiness of the campuses we connect. Campuses need to distribute the connectivity to their faculty members, researchers and students in order to unleash the latent demand that creates Internet traffic in the KENET network that makes us sustainable.

Today KENET engineers still spend about 40-50% of their time in the member institutions ensuring that our member institution campuses are ready although this is not explicitly our mandate! Our engineers also offer residential and online capacity building workshops to ICT technical staff of member institutions.

Nairobi is one of the most vibrant and competitive places for telecommunication services these days. How does KENET attract new talent into the organisation?

I joined KENET after spending time in universities where I had learnt how to recruit, retain and motivate faculty. I had learnt that the working environment was very important to young faculty members who needed to build their careers.

We had to use similar techniques to retain talent since KENET could not initially offer the high salaries of the many mobile and Internet services operators. We had to strike a balance and create a healthy working environment.

We therefore created an environment where young graduate engineers were involved in interesting and challenging work and projects that allowed them to grow as engineers very rapidly. People are attracted to be among other people who are doing great things!

Young people love interesting projects. KENET has been fortunate to be on a growth path for the last ten years. Whether it is fibre roll-outs, perfSONAR adoption, setting up data centres and community cloud services or building the first African digital certification authority that is accredited in Europe: we have consistently been able to offer our young people interesting projects to get involved in.

But in the last four years, we have also made an in-depth salary analysis and I have gone back to my Board with the results. As a consequence, KENET can strike a healthy balance between competitive salaries in our environment and the opportunities for training, learning and growing.

Where do you see R&E networks developing over the next five years? What do you think the GÉANT community needs to be aware of, what should we do?

Successful NRENs have been able to unite their respective communities. Their members know that the NREN belongs to the community and that it matters to their individual and collective future that the NREN is successful.

But this community based approach is increasingly assaulted. We are assaulted beyond the network, in the cloud.

How do we continue to show the value to our community? We have to help the institutions and universities to execute their mission. We need to keep showing that as an NREN we are critical to our members´ future and their growth. And we have to look for new members, we need to become implementation partners outside of the pure R&E environment, supporting our governments and their policy and objectives in ICT, education and innovation. I am wary about the cloud framework agreements that GÉANT has signed. Are they not easily turned into a double-edged sword? KENET is proud to be the community cloud provider, we are building a sustainable community cloud mainly because our institutions are still in the early stages of cloud adoption. This is also important as we ensure that we keep developing our local skills for the cloud.

And it is important that we are at peace with the commercial operators. In KENET we have been successful in managing our business relationships with our commercial leased line or dark fibre providers by demonstrating that it is a win-win business partnership.

When I talk to colleagues in Europe, they tell me they have a skills shortage, for example, in software development. Maybe this is where we can take collaboration between NRENs to a completely new levels. Let us in Africa provide you in Europe with the skills you need and you provide us with the projects to execute! This way we can recruit and develop high-end ICT talent that could provide technical services to NRENs in the North at competitive costs, similar to the way India has been a software house for the corporate sector in developed countries.

We are really glad that you will deliver a key note at TNC. What do you expect from your attendance at the conference? Will you travel alone or with colleagues? Do you plan to see a bit of Northern Europe before or after the event?

I am excited about going to Norway. The furthest I have been north so far in my life has been Amsterdam in the Netherlands. I am interested in Norway as a country, their success as a nation, their effective education system and the innovative potential. I want to see how the Norwegians live and I would like to visit one of their universities. I am excited to see how the sun never sets, I can hardly imagine that. And then of course, I will be looking for souvenirs. I am travelling with Kennedy Aseda who is on the Global eduroam Governance Committee representing Africa. Kennedy and I have high expectations for our visit to Trondheim, but maybe not of the weather…

And then of course, TNC means meeting friends. The last time I was at TNC was in 2013 in Maastricht, so I really look forward to catching up with my colleagues and friends in the community.

GÉANT ASSOCIATION CONFIRMS CEO AND FINALISES LEGAL STRUCTURE

The busy times continue for GÉANT Association!

GÉANT's 2017 Annual Report is now available at **ar2017.geant.org**

We are delighted to have earlier this year confirmed Erik Huizer in his role as Chief Executive Officer (CEO), following his appointment in July 2017 on an interim basis. Erik has a long-standing involvement with the NREN community, most recently as CTO of SURFnet and a member of the GÉANT Association Board of Directors, and previously as Managing Director for ICT at the Netherlands Organisation for Applied Scientific Research (TNO).

Erik has fulfilled various board-level functions of Internet related organisations and for over 30 years has been involved in education and research networking, Internet standardisation and Internet governance. For his contributions to the Internet he was inducted into the Internet Hall of Fame in 2014.

Christian Grimm, Chair of the Board of Directors commented at the time of the appointment, "We are very pleased to announce that the GÉANT Board of Directors has unanimously agreed to appoint Erik Huizer as new permanent CEO of GÉANT, effective 1 May 2018. In his time as interim CEO of GÉANT Erik has proven his strong appreciation and support for the value GÉANT provides to the European research and education networking community. We know that GÉANT is facing exciting opportunities in the upcoming years and will need to prepare its future way through a highly dynamic European funding landscape. With these challenges and opportunities ahead, the Board believes Erik will provide the type of leadership that members, staff and the entire European research and education community expect and require. The GÉANT Board is looking forward to working with Erik and his executive team on a successful future for GÉANT."

Commenting on the appointment, Erik added, "When I started at GÉANT I was very pleased to find a professional and dedicated organisation full with people who are passionate about their jobs and about serving the R&E community. The NREN community, of which GÉANT is part, is a wonderful community to work with. Many different cultures but with a common goal. I am honoured to be the CEO of GÉANT and I really look forward to continue working with all the people in this area."

New legal structure for GÉANT

We are also pleased to announce that on 31 March 2018 GÉANT's legal structure changed to reflect one legal entity, GÉANT Association based in Amsterdam, with a UK branch in Cambridge that will continue with existing operations and staff.

See Voice of the Board interview with David Wrathmall on pages 14-15 for more on this topic.

For more information on GÉANT's Executive Team see **www.geant.org**

VOICE OF THE BOARD: DAVID WRATHMALL, CFO, GÉANT

It´s almost five years ago that David Wrathmall joined GÉANT as Chief Financial Officer. Since then, David has been responsible for GÉANT's Financial, Procurement, Human Resource and Facility Management operations, and oversees all aspects of statutory and legal compliance. He is also Company Secretary and supports the Association's Members, Board and Audit and Risk Advisory Committee to ensure effective governance. As a result David has been at the centre of the DANTE – TERENA merger and legal restructure from the start. CONNECT spent time with him to talk about this and the finalising of the legal restructure of GÉANT.

What were the original drivers of the merger and subsequent legal restructure?

It was the community's desire for a single organisation to bring greater coordination and less overhead, that originally drove the merger between DANTE and TERENA.

At the time DANTE had 15 shareholders – a subset of the TERENA membership. However as not all members of TERENA were legally able to become shareholders in a UK company, so the transferring of shares from DANTE to TERENA was perceived to be the optimal way to merge the two organisations. The share transfer process started in 2013 and by 2014 – under the trading name of GÉANT – the two legal entities of GEANT Limited in Cambridge and GÉANT Association in Amsterdam were established.

Over time the organisation evolved to a position where in 2017 it was operating well under a single CEO and an Executive Team overseeing departments that spanned the two offices.

The maintaining of two legal entities during this time remained the optimal approach from the perspective of taxation. Under advice from several external advisers the Board accepted this approach, as moving to one legal entity was a considerable task requiring significant investment in time and resource.

However in March 2017, in order to build on the progress made since the 2014 share transfer and to further reduce overheads and strengthen the value proposition for GÉANTs stakeholders, a resolution was put to the members to complete the consolidation process and create one legal entity.

Furthermore, as a result of the UK referendum and the UK government's intention to leave the European Union it was considered that there was a material risk of GEANT Limited becoming ineligible for ongoing EU funding following the expected completion of the BREXIT process.

This meant a change of focus from an entirely tax-optimal position to one of safeguarding the continued successful operation of the GÉANT (GN4) project upon which research and education communities across Europe rely every day.

The Members agreed that it was in the best interests of all stakeholders to accelerate the process of legal restructuring and that the most risk-averse approach was to transfer ownership of GEANT Limited's networking equipment and staff contracts to the GÉANT Association – which is incorporated in the EU – whilst establishing a UK branch to continue UK operations.

So where are we now?

Well, in Q1 2017 we carried out a procurement exercise and as a result appointed Ernst & Young to advise us throughout the process on legal and taxation aspects.

Work on the legal restructure was fully underway by June 2017 with a 12 month timeline, and I'm pleased to say that with huge effort on all sides the process was completed early within just 9 months and finalised on 31 March 2018.

We are now GÉANT Association – headquartered in Amsterdam – with a UK branch in Cambridge. We now have a permanent CEO in Erik Huizer supported by an established Executive Team, members of which have clear responsibilities and reporting lines, and a fully integrated staff.

There is still much work to be done as a result of this however, for example we are continuing to work with tax authorities with regards to the transfer of ownership of our extensive network equipment across Europe, and our procurement processes must now reflect Dutch procurement rules.

It's important for me to stress that the recent legal restructure has demonstrated an excellent collaborative spirit within GÉANT. Achieving the end result ahead of schedule is largely due to the commitment of staff across various departments – particularly Finance, Procurement, HR, Operations and Project Management. Staff involved have worked long hours on the legal restructure at times when there was other important work going on, such as the 2017 financial audit. So I want to take this opportunity to give a big shout out to my colleagues for their support in getting us to this point.

What are the expected benefits of the new legal structure?

First and foremost, completing the new legal restructure has ensured the viability of GÉANT's funding model post-Brexit, which in turn means the continued successful operation of the GÉANT (GN4) project. This is welcome news for the 40+ project partners and 500+ project participants, as well as for the thousands of institutions and organisations reliant on the project.

There are also many expected operational benefits. For example our members are now billed from a single organisation reducing administration efforts. All GÉANT contracts (and there are thousands across Europe) are now with a single organisation. Many internal policies and systems can now be more closely aligned leading to more timely and accurate reporting – which in turn feeds quicker decision-making. And as part of the process we have implemented new, more responsive procurement processes which also reflect procurement compliance in The Netherlands.

It also further builds on the original merger process, and brings together more closely the people and projects across GÉANT under a clearer governance structure, benefiting all our stakeholders. We are currently working on the first budget (for 2019) created under one legal entity and it feels like a final step towards achieving a closely integrated organisation.

What difference does this restructure make for the GÉANT users, support to scientists and educators?

In the best possible way, we hope the research and education communities don't notice a difference! We want the projects we manage, coordinate and participate in to continue operating successfully and seamlessly. That means no disruption to service, and activities continuing to support development and innovation.

We have seen cases recently in the UK where the scientific and research community is already being impacted by potential implications of Brexit. Our work over the past few years has provided us with options to successfully minimise that risk. However, we are not complacent and continue to work to ensure continuity of operations for the benefit of all our stakeholders. It is the avoidance of any disruption to this which ishas the biggest impact – and benefit – of the restructure.

Having delivered the restructure – which big project is next on your horizon?

The considerable time and resource expended on this process – and in particular in finalising the legal restructure 3 months early – has been well spent, but it has understandably impacted other activities. So although there remains much to do, we are now in a position to prioritise other projects.

These include enhanced back-end systems to aid faster reporting; automated internal systems to reduce the administration burden for our staff and project participants; and new portals to streamline our recruitment processes and better support our workforce.

In addition, with the next round of EC funding (€128M) commencing in 2019, there is the important task of ensuring there is appropriate financial analysis and planning information to support the GN4-3 decision-making process, in terms of funding allocation and impact on cost share and EC rebates over the next 4 years, to the end of the Horizon 2020 programme.

DIGITAL INFRASTRUCTURES for RESEARCH 2018
Serving the user base

DI4R2018: CHALLENGES FOR RESEARCH COMMUNITIES AROUND OPEN SCIENCE

The third edition of the annual Digital Infrastructures for Research (DI4R) conference will be held this year at the University of Lisbon campus in Lisbon, Portugal from 9-11 October.

Building on the success of DI4R2016 (Krakow) and DI4R2017 (Brussels), DI4R2018 promises to be the biggest and best yet. Jointly organised by EOSC-hub, GÉANT, OpenAIRE and PRACE, the event will bring a packed programme of sessions, posters and networking opportunities to Europe's researchers, developers and service providers – leading to brainstorming and discussions on how best to serve the user base.

Call for Abstracts

This year, our Programme Committee is chaired by Volker Guelzow (from DESY in Hamburg, Germany) and Sinéad Ryan (from Trinity College in Dublin, Ireland). We welcome contributions about requirements, solutions, best practices, success stories and ongoing developments in the following topical areas:

- Area 1. Cross-Domain challenges / Data exchange across domains: researchers, technologists
- Area 2. Open Science and skills
- Area 3. Computing and Virtual Research Environments
- Area 4. Security, trust and identity
- Area 5. Digital Infrastructures for EOSC and/or EDI
- Area 6. Business models, sustainability and policies
- Area 7. Innovation in Open Science with SMEs and Industry

To submit your abstract, please visit the DI4R2018 website and follow the instructions. Please also note the deadline of 29 June.

Web:
www.digitalinfrastructures.eu
Twitter:
https://twitter.com/DI4R_eu

CLOUD SERVICES: EVENTS AND WORKSHOPS IN THE COMMUNITY

NRENs and their institutions have been pretty busy in the first half of 2018 establishing their cloud offerings and promoting services and support to institutions and users. Numerous events were held throughout Europe and the Southern and Eastern Mediterranean. Here are some highlights from just a few of the events that took place recently.

Cyprus

Universities, Schools and Research Institutions in Cyprus were introduced to Microsoft Azure cloud services through the GÉANT IaaS framework agreement at a workshop hosted by CyNet on the Microsoft offering for universities. Over 50 attendees participated in the event held on 29 March in Nicosia. The programme included sessions on CyNet and its new perspectives; the GÉANT IaaS Framework and Azure4Edu; biometrics, learning analytics and gamified learning tools from SCM Secure; DocuSign tools for educational administration and processes; and Microsoft reseller AppXite. Representatives from Appxite were on hand as well.

Israel

On 14 February IUCC launched the Inter-University Cloud Forum. IT staff from Israel's universities gathered for a working meeting to discuss an introduction to IUCC's cloud offering, implementation of the GÉANT Framework in Israel, tips for managing AWS environments and Microsoft Azure costs. Lively discussions focused on the unique challenges of using cloud services by researchers, with an emphasis on budgets, allocation and information security. IUCC expressed its pledge to support and work alongside institutions to assist in exploiting the advantages of cloud services and the added-value the GÉANT framework single market will hopefully bring to the table.

The highlight of the forum was a presentation on a proof of concept process successfully used to create an HPC environment based on Microsoft Azure at the Weizmann Institute of Science. The forum will meet every two months.

Norway

On 21 March, the Norwegian higher education cloud initiative (UH-Sky) organised a conference on Microsoft Azure on how IT organisations can use cloud services in their everyday routines. Eighty participants, developers and technical managers from ICT departments, gathered at Gardermoen. Representatives from Microsoft Azure and ATEA (preferred joint supplier) were on hand to answer any questions.

As part of the GÉANT IaaS framework, Norwegian research and higher education institutions can utilise Microsoft Azure through three resellers. Norwegian universities and institutions only need to sign a call-off agreement to use Microsoft Azure IaaS-technology.

Switzerland

On 10 April, SWITCH hosted its third Higher Education Cloud Day at the University of Bern. The Higher Education Cloud Days are an open and collaborative environment to gain knowledge shared user experiences and best practices. Registration exceeded expectations, with around 65 attendees filling the meeting room to capacity. Almost all universities participated, along with university hospitals and CERN. The program highlighted sessions with speakers from Google, Microsoft, AWS, amanox and SWITCH. The sessions were accompanied by a lively discussion of the GÉANT tender and framework agreements.

Stay up to date on more events and news at **https://clouds.geant.org/news/**

SPANISH CONSORTIUM LAUNCHES UNIDISC STORAGE SOLUTION VIA THE GÉANT CLOUD OFFERING

When the Consorci de Serveis Universitaris de Catalunya (CSUC) looked toward the clouds to improve effectiveness and efficiency by leveraging synergies and economies of scale to bring state of the art services to its members, they found the right solution at the right price from the GÉANT Cloud Offering. CSUC is a consortium of 10 universities and the Catalan Government, providing academic services, scientific, library, and knowledge transfer to more than 80 research institutions and centres in the Catalan region of Spain.

In mid-March, CSUC officially launched its UNIDisc service, a cloud storage service based on OwnCloud, acquired via the GÉANT offering for the Catalan education and research community.

Under the hood

UNIDisc offers users an easy way to store, synchronise and share files in a secure and reliable community cloud. Initially acquiring 5,000 licenses, UNIDisc is currently available at three different institutions. By default, each user of this pay-per-use service gets 100 Gb data storage capacity, and can access their files at all times, from any location and device thanks to offline synchronisation. Users can grant guest users access to their personal files. UNIDisc is easily accessible by logging on via the CSUC's UNIFICAT, the identity federation for the Catalan university and research community.

Why OwnCloud?

In anticipation of launching a cloud storage service, CSUC formed a working group of representatives from all 10 universities. Several of the working group members were familiar with OwnCloud, the platform they were using at their home institutions. With OwnCloud server, members enjoyed many of the solution's powerful features, like online editing, anti-ransomware protection, the ability to add additional private disk, federated access, easy and secure file sharing within the education and research community thanks to the support of GÉANT Open Cloud Mesh, its commitment to open source, the ability to completely brand the CSUC offering, multi-platform and mobile support and transversal work.

According to Jordi Guijarro Olivares, CSUC's Operations & Security Manager, the choice was ideal. "We had a strong installed base, and end users who were already familiar with the platform. The chance to link other storage media to the OwnCloud environment, such as from institutional data centres, and configure the storage discs was a deal-breaker for our users. OwnCloud met, or exceeded, all the benchmarks the working group had, and we could see that it could scale and grow as demand increases. The support provided by the Spanish partner was an important factor as well."

The GÉANT Offering Advantage

Key to making the OwnCloud solution into a cost-effective, viable service for CSUC and its members was the GÉANT Cloud Offering. "There was a huge difference in the cost of the licenses, compared to a standard commercial contract," says Jordi. "The offering enabled us to save ten times the final cost of licenses. Without it, I am not sure if we would be in the position to build and offer a service like UNIDisc."

What's next?

With the successful completion of pre-production testing in February, the service was launched in mid-March. Today it can support 3,000 users. Initially, university ICT departments are testing the service and providing important feedback. CSUC is now preparing official launch events and a press package to market the service to end users. Expect more news from this Catalan Consortium, as the research and education community prepares to take file sync and storage to the next level – reaching to the clouds for more functionality, more power and more flexibility as the community's data needs continue to grow and expand.

TO SEE OR NOT TO SEE...

When it comes to unleashing the power of web and video conferencing to benefit research and education, there's really no question whether we should! Instead the real question is how to optimally deploy a solution that meets the needs of the R&E institutions – cost-effectively and securely.

GÉANT and NORDUnet jointly ran an EU-level tender to provide unmanaged (on-premise) and hybrid-managed video conferencing and real-time communications. All vendors were required to fulfil these mandatory technical requirements:

- clientless access
- VC room connectors
- multi-tenancy
- SAML2 WebSSO
- standards-based API
- hardware-agnostic
- recording option
- professional services/software support.

The tender process was completed in late 2017 and NRENs are already sending call-off contracts to suppliers directly.

Jan Ruzicka from CESNET in the Czech Republic and Christian Meyer from DFN in Germany share their experience.

cesnet

At CESNET we needed to improve and enlarge the capacity of our current infrastructure. We felt the best way to do this was to aggregate demand. Then interface with solution providers to get better pricing terms.

We still have, and use, our legacy MCUs in our datacenters serving videoconferencing (SIP and H.323 clients) and Adobe Connect on our servers. But the new Kinley licenses and plan gives us more flexible capacity planning that runs on commodity hardware. We can independently upgrade and enlarge our hardware platform with lower investment costs than for MCUs. The Framework licensing plan also opens new ways to access the service, like WebRTC and Skype4Business. This simplifies and expands the reach of our system for end users.

By changing our cost structure from capital investment to an operational budget model, we know our fixed annual fees. This helps us to better plan and deploy platform revisions in the future.

DFN
DEUTSCHES FORSCHUNGSNETZ

DFN needed to simplify and improve our videoconferencing platform and combine it with web conferencing functionality. We had dedicated Cisco hardware, which was end-of-life. Adobe Connect, a proprietary web conferencing tool, had certain drawbacks. So we were in the market for a fresh approach. We believed that we could benefit from the economies of scale of aggregated NREN demand and were eager to help create synergy among other European NRENs.

Pexip, distributed by Kinley, is a modern platform that offers new ways to access the services, such as WebRTC and Skype. Scaling is much more flexible and cost-effective, since we merely buy licenses and run the software on commodity servers. We expect to roll out the new service in June 2018 and to add live streaming and recording with on demand streaming soon afterwards. We would not have been able to offer that before.

perfSONAR

PERFSONAR CELEBRATES 17 YEARS DURING PLANNING MEETING

The perfSONAR project recently celebrated 17 years of successful collaboration during a planning meeting held March 7-8, 2018 in the new GÉANT office in Amsterdam. Since its first activities focused on network performance measurements in February 2001, perfSONAR has grown to an international network of collaborators who share a common vision and knowledge to work on interoperable network performance monitoring infrastructure for the benefit of research and education (R&E) networks around the globe.

With partners representing the communities of five organisations (ESnet, GÉANT, Indiana University, Internet2, University of Michigan), perfSONAR is an open source project designed to develop software that works in a real operational environment, to facilitate network research, and to permit technology transfer to commercial organisations. Today it makes it easy to set performance expectations, notice performance problems, and diagnose the causes of such problems. In recent years, the framework has been harmonised to be easy to install, configure, and supported for end users, network operators, and scientific collaborations including participants from wide e-infrastructures.

Since 2004 and the GÉANT (GN2) project framework, GÉANT has been a proud partner in defining the vision of performance monitoring, developing perfSONAR framework and has facilitated the deployment of perfSONAR monitoring infrastructure across Europe and beyond. In 2008 GÉANT began to work in parallel to other perfSONAR project partners with its own perfSONAR Multi-Domain implementation. These efforts were again strengthened in 2014 when a joint release of perfSONAR software was delivered to users.

During its years of collaboration GÉANT has significantly contributed to the design and implementation of the software while at the same time rolling out perfSONAR instances in European networks and then maintaining these essential activities over the next project phases.

Words
A. Delvaux, I. Golub, Sz. Trocha (PSNC)

Pictures
Above right; Participants of the planning meeting

Far right; perfSONAR Service Map available at http://stats.es.net/ServicesDirectory

During the planning meeting, the perfSONAR team worked on general directions and future developments that will be implemented into next releases. With the latest changes and future plans the project is aiming at the creation of opportunity for improved integration with other tools and various open source ecosystems. We make it easy by providing standard integrations and interfaces for anybody to work with the tools used by other teams or known to the community. Topics covered during the meeting included:

- Evaluation of new types of archives
- Looking at ways to leverage open-source visualization platforms
- Improvements in Lookup Service reliability
- perfSONAR in a container
- Deployments automation
- QA efforts improvements
- pScheduler Software Development Kit
- New directions for Web presence and user trainings

The partners also discussed the perfSONAR release schedule: a new 4.1 beta version is scheduled for Q2 2018.

We invite readers to become active project participants. Users may contribute to the project by helping out and contributing work to advance our open source software, deploying perfSONAR instances to increase project adoption and sharing their ideas, experience and expectations of the future of perfSONAR. For more information visit: **http://www.perfsonar.net** and subscribe to **https://www.youtube.com/perfSONARProject/**

WIFIMON: WIRELESS CROWDSOURCED PERFORMANCE MONITORING VERIFICATION

WiFi access (and in particular eduroam access) is now accepted as an essential part of the wider campus experience. Not being able to connect to network resources can damage users' experiences and can result in users having to use mobile 4G data connections rather than WiFi. Therefore it is vital that institutions carefully monitor their provision of WiFi services.

Most WiFi monitoring services merely provide information on the Availability of WiFi and can't measure the actual performance of the service. A poorly performing WiFi service affects users' experience and can also be a trigger for IT to investigate wider performance issues. But how can performance monitoring work in a situation where users are, by definition mobile?

Within eduroam enabled facilities, the situation can be even more complicated as users can have multiple eduroam access points within range - making reporting of problems harder. For this reason GÉANT are developing WiFiMon - a crowd-sourced, distributed performance monitoring and measurement service.

What is WiFiMon?

Through the GN4-2 project, GÉANT has found that a traditional approach to PMV is not always the answer. This approach looks primarily at for infrastructure level information by implementing hardware probes on the wireless campus network and answering the question "is it working?", but this does not offer any statements about how the end user is experiencing it.

How it works

WiFiMon's proposed approach to wireless crowd sourced performance monitoring verification is based on an architecture design using JavaScript and NetTest/Boomerang server, implemented on essential, highly frequented web sources. As the term implies, the accuracy of our measurements largely depends on the number of "complete" data sets. From a statistical point of view, the large amount of measured data (by end-user activities) allow us to analyse performance of a wireless network in an eduroam enabled campus/conference environment. Particular focus is placed on improved measurement verification, GUI development for visualizing the performance data in real time, and mobile device app deployment.

WiFiMon has been used across a wide range of campuses and conference locations.

To find out more and to join the WiFiMon community visit **geant.org/WiFiMon**

LOOKING FORWARD TO ANOTHER DECADE OF EDUROAM

Stefan Winter – R&D engineer at RESTENA, and technical expert at the Global eduroam Governance Committee, discusses what lies ahead for eduroam

Stefan, How do you see the current position of eduroam?

Well with more than a billion roaming authentications annually and 89 countries worldwide supporting eduroam we're seeing strong growth across the board. Even in Europe, which benefits from carriers having to abandon data roaming charges, we are still going strong, and in the rest of the world, the growth potential is enormous.

For students and researchers from all over the planet eduroam provides an essential connectivity service. This ability to roam seamlessly around the world is the unique value proposition.

Do you see the eduroam technology being adopted elsewhere?

Absolutely. The new PassPoint initiative (**https://www.wi-fi.org/discover-wi-fi/passpoint**) uses the core techniques and technologies of eduroam; we have been foundational in innovation in wireless LAN development. Also the govroam services in the Benelux area and in the UK have leveraged these technologies in the same way. We now need to work to ensure that all these activities work alongside each other and can be integrated where this is desired, to avoid them developing into distinct islands of accessibility.

What else do you see as a driver for eduroam?

I think both ease of use and security are key. For the end users, eduroam is already easy to use. However, for institutions and organisations wishing to offer eduroam there is a steep learning curve for the technologies and it can be hard for the education sector to find and retain the skilled staff. This is why we are developing cloud-based services to help organisations build-out and support eduroam for their locations and users.

We're also working to make eduroam even more secure for users; this includes advancements in our on-boarding tool eduroam CAT as well as industry initiatives and standardisation. We can proudly say that eduroam is using the best Wi-Fi technologies available, and that we continue to push those technologies further.

So where will the growth be in eduroam over the next few years?

eduroam has certainly not reached saturation point yet so there is plenty of organic growth potential even in the long-standing member countries, and much more than organic in new countries and regions.

This is why we are focusing on ease of use for institutions. We see emerging NRENs and smaller institutions as the key drivers of growth and value for eduroam in the future.

There is a lot of talk about 5G – do you think 5G will take over from Wi-Fi as the connectivity technology for users?

5G certainly promises huge advancements over existing cellular networks, including but not limited to available bandwidth. However, standardisation is not even finished at this point, and actual deployment will only start around 2020, and then only in major cities. It will take a long while before it reaches the near-ubiquity of previous generations of cellular networks. So, I believe it safe to say that Wi-Fi will be with us for a long while. One also shouldn't forget that end user demand for bandwidth typically grows as fast, or even faster, than the ability to deliver this bandwidth on the supply side. It is almost certain that a multitude of access technologies will continue to be needed to satisfy user demand.

As a further plus, eduroam is an authentication service and is largely technology neutral at the network level – it is well possible that we can venture into the 5G operator space ourselves, exploiting some of 5G's distinctive new features such as 'network slicing'. This could offer interesting potential in the future!

Learn more at **eduroam.org**

CEDIA – BRINGING R&E NETWORKING TO ECUADOR

CEDIA is a NREN with 15 years of history and in the last 4 years we have grown exponentially in the range of services that we offer including project financing, and more facilities to our members. Regionally we have a very fast network, with 100Gb in the core and last miles from 1G to 10G to the members. To help to our members we try to ensure all our services easy to deploy particularly free cloud services included in our membership.

Picture
Cuenca, Ecuador

One of the most popular and visible services we offer is eduroam where we support the universities in managing their Identity services connecting to the Ecuadorian Identity Federation (MINGA **https://www.cedia.edu.ec/minga**). In this way users at any participating university can use not only eduroam services in Ecuador but in 89 countries worldwide using their university identity.

Owing to our infrastructure, we can monitor the institutional radius and even the LDAP service of our members, but the most important benefit is that our NOC (Network Operation Center) can detect the problem and immediately solve service problems occurring on-site, improving service availability and offering a better experience to our users.

As well as eduroam inside the members' campus we are starting the deployment of some antennas with eduroam service in public places through agreements with ISPs, delivering high bandwidth through a layer 2 connection from the antenna to some of our datacenters to ensure excellent quality of service.

Such has been the success of eduroam that there are some institutions who only use eduroam for Wi-Fi access and it has been a major driver for the wider use of identity federation services.

CEDIA is rapidly growing with more services being offered to all our members, including new services to allow to research synergies between academic researchers and the private sector. For this service CEDIA as a bridge between institutions and corporations and playing a major role in helping developments across the whole of Ecuador. **https://www.cedia.edu.ec/en/about-us/technological-innovation-and-transfer**

In the last year we have also added high-schools as members into the NREN, and a new dedicated services portfolio, with service focused on the high-school users. CEDIA plays a major role in helping IT staff to deploy services. We look forward to supporting and serving the R&E community in Ecuador for another 15 years.

https://www.cedia.edu.ec

VISITOR ACCESS TO EDUROAM AT TNC18

With over 25,000 locations in 89 countries, eduroam is one of the most successful and visible services NRENs and institutions offer the research and education community. Over 1 billion authentications are made every year and the service continues to grow and grow. But with many visitors to our campuses and buildings every day we face the problem of setting up Wi-Fi access differently for these users. We all know that publishing shared usernames and passwords is far from ideal but the effort needed to provide temporary passwords (often for only a few hours) to each visitor can be prohibitive.

This is why SURF have developed eduroam Visitor Access. With this service, visitors can be provided with unique, time limited accounts that can be used to access eduroam access points.

This is how it works:

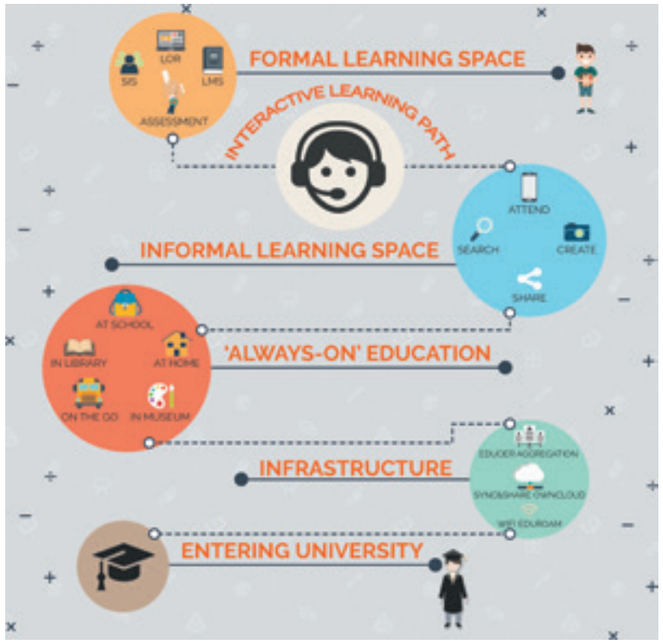
- A temporary personal eduroam account is created, and the visitor receives an email and SMS message containing their login details, which automatically become invalid after a period of time that can be set by the institution.
- Both visitors and your institution have the advantage of low-threshold access to eduroam for visitors.
- The visitor can use the network securely and is no longer at the mercy of less secure (open) guest networks or other (unknown) Wi-Fi networks in the vicinity of the institution.
- Your institution knows exactly who is on its network and retains control.

With eduroam Visitor Access you can create individual accounts, but you can also create multiple accounts simultaneously, for instance for conferences. This service will be available at TNC18 for visitors that don't have an eduroam account.

eduroam Visitor Access is already used by a substantial number of Dutch education and research institutions, offered by SURF. Last year SURF worked on a pilot with Jisc and at the moment, SURF is helping Canadian NREN CANARIE test eduroam Visitor Access.

SURF and GÉANT are delighted to be able to offer visitors to TNC18 full access to eduroam for the duration of the conference.

https://www.surf.nl/en/services-and-products/eduroam/eduroam-visitor-accessn



UP2U TRAINING ACTIVITY HELPS PREPARE FOR PILOTS

The Up to University (Up2U) project is focusing on helping secondary school students developing 21st century skills that will be essential for them when they enter the university. In order to achieve this goal, the project provides a Moodle based learning platform, the Next Generation Digital Learning Environment (NGDLE) that integrates tools, which could be useful for teachers if they want to implement the latest innovations in their classrooms. The project provides training for those teachers who are willing to try our solution, and ready to take part in our pilot activity. In the first phase, the trainings were held in Greece and in Italy, which will be followed by CERN and Poland

The Greek case in the Up2U training activity

The first Up2U training course was launched at the end of March and ended in May. The training was organised and coordinated by project partners the National Technical University of Athens (NTUA) and the Greek Research and Technology Network (GRNET).

The full functionality of the platform was demonstrated via hands-on experience. The teachers created their own content and had the opportunity to experience the Up2U learning environment.

In Greece, the whole training programme is 6 weeks long. 80 teachers from 8 Greek pilot schools were divided in two different groups depending on their level of digital knowledge. The two groups were based on the answers we collected from the questionnaire they completed during their online registration for the training. In order to measure the skills of the teachers they had to answer questions regarding their digital background and recent pedagogical training experiences. Each group attended a 4-hour afternoon training, one day per week. For each session the trainers created a presentation and demonstration with hands-on experience for all the trainees. For this, each trainee used a laptop.

Regarding the tools that Up2U provides, the majority of teachers were familiar with Moodle. However, they had little or no knowledge about the other tools that are integrated to the platform (like H5P, KnockPlop, SeLCont, EduOER, DSpace, Cernbox) and as a result they didn't know how to use it properly. Teachers seemed to be confident about their ability to include and promote specific skills (e.g. critical thinking, problem solving, media literacy) in their courses.

At the end of the training, teachers filled out a final evaluation form to give feedback on the training course regarding the content, material, duration, location etc. The results and conclusions gathered of the use cases and the final questionnaire can provide important feedback for possible improvements or enrichments to the methodology that was used. The evaluation phase is very valuable for the project's training strategy.

The Italian case in the Up2U training activity

The second country that launched the training activity was Italy. The organisation and coordination were managed by Sapienza University of Rome and the Italian NREN GARR. The training started in late April and ended in May. In Italy, being an intense time of the year for many schools, only 11 teachers from 5 schools participated in this first training programme. They went through a blended collaborative approach, mixing classroom and online activities, and working in groups of 5-6, through guided discussions, role taking, technical training, project-based learning and individual study of materials.

The programme started with a kick-off event followed by the Moodle practical training. After a full-day of classroom activities, the e-learning sessions began focusing on techniques and strategies for an effective and active learning, such as role taking, jigsaw, brainstorming, creative thinking and coding. During the period of online activities, teachers were guided by the Sapienza experts team via coaching and delivering materials, and online tutors who were available to respond upon request for support. The GARR training on the Up2U learning platform continued through webinars and exercises in the Moodle test area where each teacher created his/her test course.

The Italian teachers were asked to fill out the same questionnaire that the Greek teachers filled out at the beginning and at the end of the training program. Their feedback on the sessions is very useful and their suggestions will be incorporated and remarks will be reflected on in the upcoming trainings.

Using the same questionnaire will give us the chance to compare the different approaches the pilot countries implemented during the training. The different approaches are based on a solid common ground of perspectives and techniques.

The training activity will be continued by CERN in Switzerland and by Poznan Supercomputing and Networking Center (PSNC) in Poland. Later on, countries like Germany, Hungary, Lithuania and Portugal will join this activity. In the long run, the project aims to include countries outside the project consortium, so more schools can benefit from the project's learning environment.

THE AARC BLUEPRINT ARCHITECTURE TO SUPPORT RESEARCH COLLABORATIONS

CONNECT spoke with Nicolas Liampotis (AARC architecture WP leader); Christos Kanellopoulos (AEGIS chair); David Groep (AARC policy WP leader); and Licia Florio (AARC project coordinator) to learn more about the AARC BPA.

What is the AARC BluePrint Architecture (BPA) and who is it for?

The AARC BPA defines a reference architecture for authentication and authorisation infrastructures (AAI) that best fits the needs of international research collaborations. The AARC BPA is meant to guide architects in research collaborations in building interoperable AAIs.

Why does AARC offer a blueprint instead of an implementation that can be downloaded and installed?

The AARC BPA provides a set of architectural building blocks, along with implementation and policy guidelines and a common vocabulary with which to discuss and implement interoperable AAI solutions. It thus allows AAI software architects and technical decision makers to build solutions which fit their specific requirements and are guaranteed to interoperate with other BPA-compliant implementations.

Offering an implementation is not desirable as it would mean offering one solution to fit all needs, which is of course very prescriptive and not inclusive.

Why do we need an AARC BPA if there is eduGAIN?

eduGAIN and the national R&E identity federations enable the federation of identities and services globally. AARC is leveraging eduGAIN as the foundation for federated identities and adds the dimension of the research collaborations. The relationship between the users' home institutions and service providers, which is typically found in the national identity federations and eduGAIN, now becomes a relationship between a research community, the users' home institutions and service providers.

The AARC BPA builds on top of eduGAIN and adds the functionality required to support common use cases within research collaborations, such as access to non-web services and access to resources based on community membership. The AARC BPA champions a proxy architecture in which services in a research collaboration can connect to a single point, the proxy, which itself takes the responsibility for providing the connection to the identity federations in eduGAIN, thus reducing the need for each service having to separately connect to a federation/eduGAIN.

The AARC BPA has played a significant role in "standardising" this architecture, by providing a reference architecture along with a set of technical and policy implementation guidelines. Three years after the AARC initiative started, we are witnessing wide adoption of the AARC BPA as the reference model for building AAIs for research collaboration in Europe and beyond. A number of solutions are already available, allowing research collaborations to pick the one that best fits their needs, without having to worry about interoperability and vendor lock-in.

How does AARC help my research collaboration/ infrastructure to deploy an AAI that is AARC BPA compliant?

The AARC BPA comes with a reference architecture and a set of technical and policy implementation guidelines, along with a policy development 'kit', that helps you on your way. The guidelines help you pick the best way of identifying your users - and keeping track of them when they move jobs through their career, but remain associated with your collaboration; and template policies to help you organise your community to access data, computing and network services without researchers being bothered with Terms and Conditions and tick-boxes all the time. If you operate your own AAI, there are guidelines for you to manage data protection and the sharing of attributes - just look at the "Snctfi" framework that helps you interoperate with resource providers and peers alike, and use the guidelines to fill in the missing bits.

Who is deploying an AARC BPA compliant AAI?

The AARC BPA has already been adopted by many e-infrastructure providers, research infrastructures and collaborations. Examples include:

- DARIAH - Digital Research Infrastructure for Arts and Humanities
- EGI
- ELIXIR
- EUDAT
- GÉANT
- Life Sciences - A cluster of 13 research communities from the Life Sciences domain
- LIGO (The Laser Interferometer Gravitational-Wave Observatory),

In parallel, there are a number of AARC pilots that are being carried out where more research collaborations, such as WLCG (Worldwide Large Hadron Collider Computing Grid), CTA (Cherenkov Telescope Array) and EPOS (Earth Science Collaboration Clusters), are testing the implementation of AARC BPA compliant AAIs.

My research infrastructure operates an AAI how can I check if it is AARC BPA compliant?

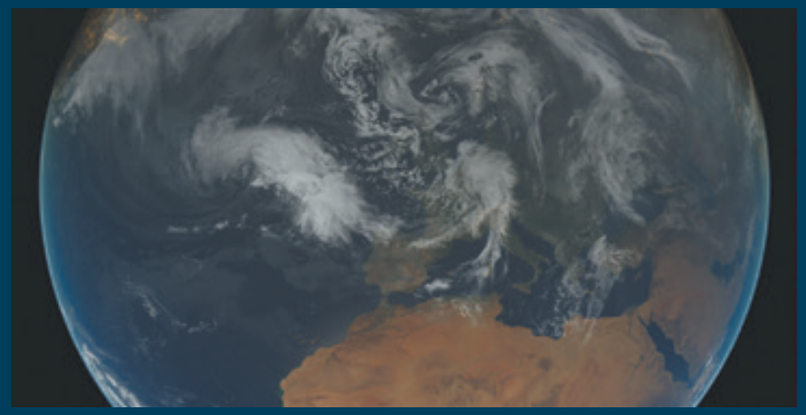
If your AAI implements the AARC guidelines and uses an IdP/SP proxy, then you are mostly likely compliant with the AARC BPA. In order to facilitate the interaction and dialogue with and between operators of AAIs that implement the AARC BPA, we created the "AARC Engagement Group for Infrastructures - AEGIS", which provides a forum for infrastructure operators to engage with AARC and discuss the adoption of the AARC outcomes in their production environments. Research collaborations that operate an AAI that uses an IdP/SP proxy and who want to benefit from the AARC BPA are welcome and encouraged to get in touch with the AARC team, who will be happy to review their current architecture and help them in adopting the AARC BPA

A new version is expected in the summer 2018 - what will change in this version?

While the current version of the BPA provides a blueprint for implementing an AAI, the next version of the AARC BPA focuses on the cross-AAI interoperability aspects, to address an increasing number of use cases from research communities requiring access to federated resources offered by different infrastructure providers. The new version of the BPA will offer a broader view.

AARC GIVES FEDERATED IDENTITY TRAINING TO RESEARCH COMMUNITIES

Research communities sometimes need face-to-face training, in order to better understand what authentication and authorisation infrastructure (AAI) solutions are available for them. For this reason, the training team of the European project AARC (Authentication and Authorisation for Research and Collaboration) decided to organise ad-hoc training courses alongside community-dedicated events. This was the case for EPOS, which gathered Earth sciences communities in Portugal last March, and a Life Science event, held in Germany last April.



In March, at the EPOS meeting in Lisbon, around 30 participants attended an AARC training event, where they learned about the basics of AARC, the blueprint architecture and relevant policy frameworks needed for them to deploy an AAI. Also, this training event paved the way for an EPOS pilot solution that is planned in the AARC project. It proved the importance of reaching out to research communities in order to understand their needs and address them with available solutions.

In April, representatives from several life science communities welcomed the project's training team at the BMS AAI meeting organised by CORBEL. The participants came from BBMRI, ELIXIR, Euro-Bioimaging, INFRAFRONTIER, INSTRUCT and CORBEL and joined the two-half-day workshop in Munich. This event was then followed by a further one-day training by ELIXIR, on more technical aspects of connecting to the ELIXIR infrastructure. The focus was to provide basic concepts about AAI and its benefits, with a focus on the new AAI for life sciences that is being piloted within the AARC project.

During both events questions and doubts were addressed and participant feedback showed a very positive response to the AAI concepts and satisfaction about the training goal, scope and quality. Also, the sharing of research collaboration use-cases was particularly appreciated, and this encouraged the AARC team to interact with the research collaborations participating in the project to ensure more information is shared among them.

For the future, the participants expressed their desire to address also some specific technical aspects and getting insights into detailed implementations of existing architectures and more specific training on AARC results regarding architecture and policy.

The feedback received is very valuable and will be taken into consideration for future AARC training events that will take place in the second half of this year.

Further information:
https://aarc-project.eu

HELPING RESEARCH COMMUNITIES' 'HEARTBEATS' TO SYNC AND SHARE: FEDERATED IDENTITY MANAGEMENT

At the heart of research communities are networks of individuals, who bring together universities and institutions to tackle the unsolved questions of science and the humanities. Allowing them to access shared online services that are specific to their field is a federated identity management (FIM) challenge that the AARC project (Authentication and Authorisation for Research and Collaboration) and the FIM4R (Federated Identity Management for Research) community have been working hand-in-glove to address.

FIM is an arrangement that can be made among multiple organisations, letting subscribers use their own institutional credentials to access the secured resources of other participating organisations. With a large potential for synergies through a 'synchronised heartbeat' between different communities, many fields have shown an increasing interest in a common approach to FIM in recent years.

At TNC18, AARC and FIM4R are represented in two sessions: one highlighting research communities that are being helped by the networking community to adopt FIM; the other to share the conclusions of a new FIM4R whitepaper identifying requirements and recommendations to research communities, technology providers, funding bodies and others.

FIM4R whitepaper

FIM4R is a forum for research communities to share challenges and ideas. In 2012 the group defined a common vision, a set of requirements, and recommendations for ensuring a roadmap for the uptake of FIM. An updated version of this paper, published in spring 2018, includes contributions from over 20 research communities.

Research use cases are highly varied and insights into account provisioning, identity vetting, attribute release and multi-factor authentication will be crucial for critical services. The ability for organisations to work together to resolve security incidents is a prerequisite for many research communities hoping to increase their reliance upon FIM.

The second FIM4R whitepaper documents the progress made with FIM for research, as well as the current round of challenges. Preliminary requirements gathering activities at earlier events identified multiple areas of focus. It is hoped that this paper will be an input for federation operators, technology providers, and collaborative projects such as AARC and GÉANT (GN4) as they consider their work plans for the coming years.

TNC18 Session: Tuesday 12 June 09:00-10:30

Making communities work

With more research communities moving to FIM to address their authentication needs, it's useful for communities to share their experiences and inspire each other. At TNC18, three examples will showcase how research networking can help, from Jisc (UK), SURF (NL) and the CORBEL project life science research infrastructures, which has a technical pilot in the AARC project.

TNC18 Session: Tuesday 12 June 16:00-17:30

Further information:
AARC: **https://aarc-project.eu/**
FIM4R: **https://fim4r.org/**

Picture
FIM4R participants, September 2017

EAPEC 2018 CONFERENCE TO STRENGTHEN R&E TIES BETWEEN MOLDOVA AND INTERNATIONAL PEERS

Policy makers, researchers and experts on networking, cultural heritage and high-performance computing for research and education are invited to register and to submit proposals for posters and lightning talks for EaPEC 2018.

The 3rd Eastern Partnership E-infrastructure Conference (EaPEC) will bring together decision makers and officials from ministries, academics and educational representatives from the Eastern Partnership countries, as well as international institutions responsible for promoting e-infrastructures, private companies and foundations. The event will strengthen ties between the research and education community in Moldova and their peers from other countries in the Eastern Partnership (EaP) region and in the EU.

Organised by the Eastern Partnership Connect (EaPConnect) project, the 3rd Eastern Partnership E-infrastructure Conference (EaPEC) will be hosted by RENAM, the Research and Educational Networking Association of Moldova, in Chisinau on 17-18 October 2018.

The importance of international collaboration and research and education networks to Moldovan research and education was highlighted at high-level meetings between the EaPConnect project's conference co-chair and significant Moldovan stakeholders in March.

Dr. Leonie Schäfer, Senior Manager Global Liaison at the German research and education network DFN, represented GÉANT and the EaPConnect project in meetings with significant Moldovan stakeholders. She discussed the scope of the conference with Dr. Elena Belei, the State Secretary for Research at the Ministry for Education, Culture and Research, and Dr. Peter Bogatencov, Executive Vice-Director of RENAM. Furthermore, she and Peter Bogatencov met RENAM's managing board chairman and the president and vice-president of the Academy of Sciences of Moldova.

EaPEC 2018 will feature:

- Presentations and discussions about research and e-infrastructures for Open Science, a session on Digital Libraries, Digital Heritage and Open Access, as well as workshops on CyberSecurity, Clouds and NREN services.
- Announcement of the winners of the 3rd regional Enlighten Your Research programme call and their proposed projects. With 37 proposals submitted from across the 6 EaP countries, the 2018 call broke the record set the previous year and the competition will be tough!

Call for Lightning Talks & Posters Deadline: 7 September 2018

As proven at EaPEC 2017, posters and lightning talks are great ways for EaPEC participants to get feedback on shared ideas, find new collaborators from other institutions, and spark conference discussions.

For EaPEC 2018, topics of interest include, but are not limited to: e-Infrastructure Applications, Open Science, Research Data Management, Data Science, Digital Libraries & Cultural Heritage Digitisation, High-performance Computing, and e-Science.

https://www.eapconnect.eu/conferences/eapec2018/

"We look forward to participating in the EaPEC 2018 conference. We are very pleased that this international event is coming to Chisinau because it supports a closer relationship between researchers in different countries and is a small step that helps to bring Moldova closer to Europe."

Dr. Elena Belei, Moldova State Secretary for Research

"These meetings have helped to strengthen RENAM's relationships with the Academy of Sciences of Moldova and with the Ministry for Education, Culture and Research, and we look forward to developing further ties through discussions with them and other participants at the EaPEC conference later this year."

Dr. Peter Bogatencov, Executive Vice-Director, RENAM

EDUROAM GROWING IN EUROPE'S EASTERN PARTNERSHIP COUNTRIES

Europe's Eastern Partnership countries – Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine – have made great strides in the deployment of eduroam, the secure, world-wide roaming access service for research and education. In 2017, coverage increased in the region by 470% overall from 38 to 179 service locations, with a 1600% rise in Ukraine being the most significant increase.

Alongside developments in the region's network connections to GÉANT, it is estimated that two million scientists, academics and students at over 700 institutions across the region will benefit from the boost in network and Wi-Fi connectivity.

Supporting connectivity and eduroam uptake in the region are goals of the Eastern Partnership Connect (EaPConnect) project. All six EaP countries now have eduroam successfully deployed and have been active in a range of activities to develop and promote the service.

Events and visibility

More than 130 guests from Georgia and other countries used eduroam during a UNESCO-supported event in February this year. GRENA, the Georgian NREN, provided eduroam at a celebration of the 100th anniversary of Ivane Javakhishvili Tbilisi State University (TSU), the first national university in the Caucasus. Now the major educational and research institution in Georgia, TSU has around 600 foreign students and 22,000 Georgian students.

In Ukraine, URAN developed a project for an eduroam zone for the Clinical Medical Rehabilitation Cardiac Surgery Centre of the Ministry of Health. They also provided an eduroam Wi-Fi zone in a public area of the Kiev Palace of Children and Youth, where scientific and education events are frequently held. This allowed internet connectivity for up to 250 users simultaneously. In December, URAN in cooperation with the Igor Sikorsky Kiev Polytechnic Institute held a workshop on eduroam and other URAN services.

To popularise the service, in 2017 RENAM organised four training and promotional events in universities in Moldova. In the beginning of 2018, meetings about eduroam were organised in the Republican College of Informatics and in the Ministry of Foreign Affairs.

Cooperation with Erasmus+, the EU's programme to support education, training, youth and sport in Europe, has significantly contributed to the spread of eduroam. In Georgia, information was collected about university staff and students participating in Erasmus+ who need mobility across various European universities. Merged into the virtual organisation Erasmus+, these individuals were then able to use eduroam, so promoting the service and increasing interest among Georgian universities. In Ukraine, cooperation with Erasmus+ is being explored, to set up eduroam on their premises. Armenian students also benefit from eduroam during their studies abroad under the Erasmus+ exchange programme.

Locations

In Georgia, eduroam was rolled out not only to TSU, but also in the International Black Sea University, the University of Georgia, the Georgian Institute of Public Affairs, the Caucasus University and the National Science Library. It is now available in 20 locations and negotiations are underway with more universities.

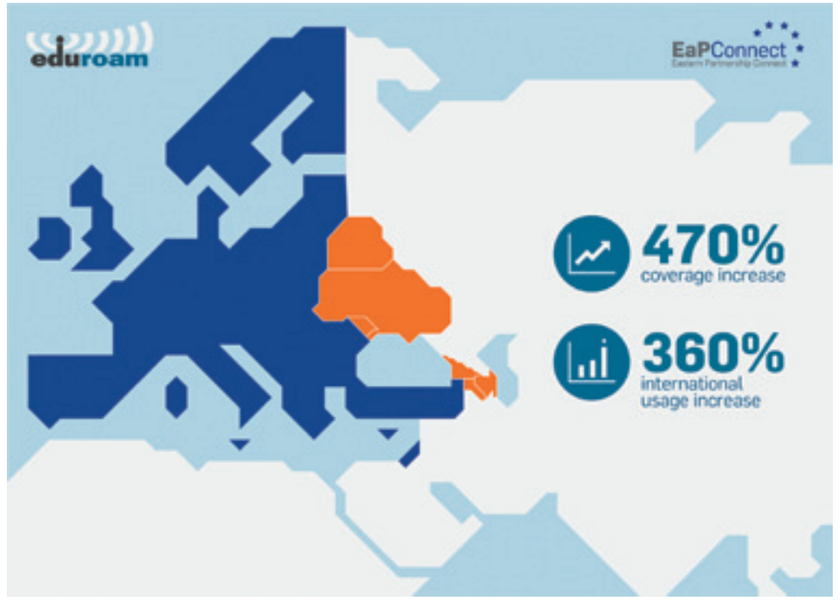
In Armenia eduroam is mostly available in the research and educational institutions of the National Academy of Sciences. ASNET-AM is actively involved in negotiations to widen the service to universities.

In Belarus in March, BASNET launched eduroam at the Belarusian State University of Informatics and Radioelectronics (BSUIR). This is the industry-leading educational establishment in Belarus for higher education in computer science and radio electronics. With 55 access points deployed across multiple faculties and departments, eduroam replaced the internal university network.

Several research institutions from the Academy of Science of Moldova and educational institutions such as the Academy of Economical Study and the Technical University of Moldova are connected to eduroam. During 2017 there were around 26000 national and 2700 international authentications.

In Azerbaijan, AzScienceNet established eduroam in 20 research institutions of the Azerbaijan National Academy of Sciences and in the Azerbaijan Medical University. As EaPConnect creates the infrastructure for international collaboration, more organisations are willing to establish eduroam.

Ukraine has seen the largest growth in eduroam deployment: having become a participant country in 2016 with 6 service locations, it now has 98. By the end of 2017, the number of service locations had increased in Azerbaijan from 18 to 21, in Armenia from 4 to 29, in Belarus from 5 to 10, and in Moldova the number quadrupled to 16. The extension of campus eduroam zones will continue next year by extending the eduroam infrastructure through EaPConnect procurement.



Technical support

To support the use of eduroam by small-scale scientific-educational institutions in Georgia, GRENA introduced a mechanism to enable them to connect using only wireless access points configured with eduroam. In contrast to the standard eduroam service authentication method, in which the user's home institution verifies the user's credentials, in this case the user information base is configured and held by GRENA, and the users are added by the organisation's specially-designed control panel.

Training

A designated eduroam training event was hosted by the Armenian project partner IIAP NAS RA / ASNET-AM in September 2017. Alongside their own staff were participants from the EaPConnect partners in Moldova and Ukraine. The event was designed to transfer technical knowledge as well as to help promote the service to users and organisations.

In line with infrastructure implementation, all EaP NRENs have provided local user training to support the adoption of the eduroam service.

www.eapconnect.eu

RASH
RRJETI AKADEMIK SHQIPTAR

GÉANT INFORMATION DAY IN ALBANIA

A successful GÉANT Information Day was held on 5th April in the capital of Albania, Tirana in partnership with the Albanian NREN RASH. More than 100 participants from the Albanian Research and Education (R&E) community attended with representatives from many universities both public and private. Additionally, we welcomed senior representatives from the region including from Bulgaria, Greece, Montenegro, Macedonia, Kosovo, Serbia and Croatia.

The event was organised in response to the interest from the Albanian R&E community in order to highlight what GÉANT can offer, how they can participate in the GÉANT project and new collaborations can be developed. Annabel Grant (Senior Stakeholder Engagement Manager, GÉANT) explains further, "The overall aim of the event was to demonstrate the benefits of NRENs and GÉANT to RASH's funders and wider community and raise the profile of R&E networking and GÉANT in the wider region."

The opening was inaugurated by Ervin Demo (Deputy Minister, Ministry of Education, Youth and Sports), Arjan Xhelaj (Director, RASH) and Erik Huizer (CEO, GÉANT). This was followed by sessions focused on how GÉANT and NRENs can collaborate in the future and was reflected in the discussion topics around Scientific Research, Education (Schools) and Community. Benefits of the GÉANT project, Cloud Services and Trust, Identity and Security Services for RASH and their R&E community were brought up in the afternoon at various site meetings.

The event kick-started discussions on new opportunities for regional collaboration and signals a very promising start of more regional work, service sharing and GÉANT service take-up.

This event was the first in a number of which will be held in the region. The next opportunity for regional networking and collaboration will be the "GÉANT Information day" held on the 6th June in Skopje, Macedonia, hosted by MARNET, preceding TNC18 in Trondheim.

E-SIM: ONE CARD FOR PRINTING, ACCESS AND CALLING?

Words
Judith Verhoeven
SURFnet

A SIM is a security element used in the authentication of subscribers before granting them access to the mobile network. The potentials of the internet-of-things market was the motivation to introduce the embedded SIM (E-SIM), allowing to change the subscription to a different mobile operator without touching the SIM card. From the perspective of a phone, however, the E-SIM is a regular SIM and does not need to be embedded on a circuit board to use its capabilities. Technically, the E-SIM is an applet with SIM card functions on a smart card. The E-SIM allows you to integrate the functions of a SIM card with those of a smart card already used by education and research institutions, for instance for student and employee cards. If you place a smart card in a phone's SIM card slot, the user is given access to the mobile network while the apps on the phone can also use the crypto functionalities of that smart card. This opens the door to a whole host of new possibilities.

SIM card and smart card in one

Education and research institutions currently use smart cards for student and employee cards. The E-SIM allows smart card functionality to be expanded by adding a SIM card functionality, and to integrate this into the phone. This means that apps running on your phone, for security purposes, are using the smart card with integrated E-SIM.

The E-SIM has its own management and maintenance methods, which have been prescribed by the telecommunications industry. Telecommunications profiles are added to the E-SIM for telephone, SMS/M2M and data communication purposes. Today, SIMs use these profiles to authenticate users and steer phones to the correct mobile network. The difference with the E-SIM is that it offers flexibility: a profile doesn't have to be placed on a smart card in a factory, as it can be uploaded. It can later be replaced by a profile from another telecommunications provider.

By placing a telecommunications profile on a smart card that is also used for the technical functionalities offered by the student and employee card, you open the door to a whole host of integrated functionalities. You can add functions to a smart card that, for example, provide access to buildings and coffee machines, but you can also add access to eduroam. The applications on the phone will then outsource the security functions to the smart card, where the telecommunications profiles are also located.

Better security than a phone

A smart card can be used as a sort of vault where you keep your passwords. An application on the phone sends a 'challenge' to the applet on the smart card, which then sends a response. Should the right response be received, the security is deemed to be acceptable. This is more secure than saving credentials on your phone.

On the way to a joint security architecture

In order to use the smart card's 'vault functionality' correctly, SURF develops a joint hardware security architecture with their member institutions. The technical and functional requirements for the hardware (the smart card) should be documented in this architecture. By making these choices together, you can convince suppliers of parking facilities, cards and printers to name a few, but also software developers to use this architecture for their products. You can then lower your procurement costs, for instance, and you will only need one card (or your phone). But there is another, more important benefit: as all the suppliers fulfil the joint architecture specifications, we can audit the whole system for security aspects. In addition, we are able to take better action in the event of security issues: with everyone using the same architecture, we can provide information on solutions centrally in the event of hacks, for example.

Integrating a smart card… or not

As mentioned above, it is possible to integrate this smart card into a phone (after all, the 'E' in E-SIM stands for 'embedded'), but you don't have to. It can also be placed in other types of devices, such as smart watches and toys. By adding NFC functionality to the smart card, you can place it in a card the size of a credit card, which is then used just like the traditional student or employee card. You can still use the smart card as a SIM card later: simply remove the smart card element from the card, place it in the SIM card slot of your phone and then push a user profile to it for communication purposes. In the pilot we previously carried out with the E-SIM, we showed that telephones operate with a regular SIM that obey all E-SIM functionalities and capabilities. Hence the E-SIM doesn't necessarily need to be integrated into the phone but can be placed on a smart card that fits in the SIM slot of a phone.

The smart card may either remain in the plastic card or could be place in a phone/tablet. The advantage of placing a smart card in a phone is that it can always be managed remotely as long as there is a network connection. Institutions can manage the smart card from a central location - making use of their own security domain - and invite mobile operators to place telecommunication profiles within the E-SIM on their smart card.

http://www.surf.nl/en/e-sim

SURF AND THE ACCELERATION AGENDA FOR INNOVATION IN EDUCATION

SURF collaborates with the Association of Universities in the Netherlands and the Association of Universities of Applied Sciences in the Netherlands, in developing the Acceleration Agenda for innovation in education. With this programme we want to better utilise the opportunities that digitalisation offers higher education in the Netherlands.

Words
Mariëlle Schipper-Heesters
SURFnet

Although no one can predict how digitalisation will have changed higher education in ten years' time, we can be sure that digitalisation will have a major impact. Many institutions in the Netherlands are actively pursuing educational innovation. Still, all the efforts and investments over the last few years have not as yet led to any large-scale changes in education. The Acceleration Agenda is aimed at stimulating and facilitating broad changes within institutions and amongst instructors.

Why now?

Technology can make a contribution towards education that is more accessible and more tailored to individual needs, and which therefore results in lower drop-out rates and better academic achievements. Students are asking for more flexibility in education so that they can combine their study, work and private life.

Alongside all the opportunities that digitalisation offers, there are also some risks. Technology in higher education is leading to some major shifts worldwide: private providers of online education and EdTech companies are carving out their own niches in the market for higher education. The use of learning data offers major opportunities for customised tutoring, but also raises issues around privacy and security. The large number of available applications makes control over choices and interoperability essential.

How will we approach this?

The Association of Universities in the Netherlands, the Association of Universities in the Applied Sciences in the Netherlands and SURF will carry out a four-year programme financed by the institutions of higher education and the Ministry of Education, Culture and Science.

The programme focuses on 8 different acceleration zones:

1. Facilitating professional development for instructors
2. Connection to the job market
3. Making education more flexible
4. A transition to digital (open) teaching aids and materials
5. Secure and reliable use of learning data
6. Evidence-based educational innovation with ICT
7. Collaboration with EdTech
8. Heading towards acceleration together

Per zone, coalitions of institutions will be formed that share the same ambition and wish to invest and collaborate in order to make progress. Together, they form an acceleration team with a leader from one of the institutions. The acceleration teams will work on acceleration within their own institution and on a shared ambition that is useful for higher education in the Netherlands. To realise their ambitions and bridge barriers, the acceleration teams will be assisted by a support team with technical, policy and legal expertise.

We are now looking for suitable and motivated people from institutions who have ambitions in these areas. We expect the programme to start at the end of 2018.

https://www.surf.nl/en/innovationprojects/customised-education/acceleration-agenda-for-innovation-in-education.html

CLOUD CONTAINERS, PRÊT-À-PORTER

Installed and tested between the end of 2017 and the beginning of 2018, the new GARR Cloud Container Platform will soon open to the research community. The new platform will complement the GARR standard cloud computing offering, based on virtual machines, which is in operation since last year and is now used by more than 500 users and growing. The container technology is one of the newest and most interesting trends in cloud and swiftly growing in the commercial world but it is not very popular yet within the research and education environment, and the GARR platform would be one of the first to be expressly dedicated to researchers.

Words
Giuseppe Attardi, GARR Computing and Storage Department

Features and benefits

Compared to traditional cloud computing, the container technology offers a more agile approach to virtualisation, which is operated on a higher level of the virtualising stack: while a virtual machine abstracts from a physical machine, a container abstracts its operating system. Within the container, we can install fully autonomous software packages, each one isolated from the others and provided with all the components they need to run: code, runtime, tools and system libraries, settings. With containers, the applications share the operating system, and especially kernels, system files, and network and disk drivers. As they don't need to include all server functions to work, they are much lighter than virtual machines, require less CPU power and can be activated in few moments: typically, in the order of the tenths of a second, against several minutes for a virtual machine. A disadvantage is that all applications in a single container must be written for the same operating system they share. However, if applications are built with portability in mind that won't be a big constraint.

The implementation

To implement the container platform, we selected an architecture that allowed us to instantiate the containers directly at the bare metal level, and not above a virtual machines layer. This approach caters for better performance and offers a direct access to the interface of special devices as GPUs (Graphics Processing Units), which cannot be shared with traditional virtualisation techniques. The GPUs are processors specifically optimised for image processing and rendering and are therefore much faster than CPUs in parallel processing of large blocks of data, as for the tensor calculus used in Deep Learning.

More power to Deep Learning and Big Data

Having access to GPUs in the academic environment can be crucial to keep the pace with leading-edge international research: indeed, it is almost impossible to compete with someone who can perform 100 experiments in the same timespan you complete one. Among the applications that can benefit more of GPUs are those based on Deep Learning, that in the last decade had amazingly good results in the fields of image processing, strategic games, robotics, automated drive, voice recognition and synthesising, automatic translation and natural language processing, and AI in general, that can use computing capacity to process large amounts of learning data.

On our Cloud Container Platform, the most common Deep Learning libraries are available as containers, to facilitate users in developing similar applications. The platform is offered to researchers from any disciplines, and not only to technical and scientific ones, as this makes the creation of new applications easier and frees researchers from most of the complexities connected with installing machines and software: applications will be built through a simple GUI, by composing them from a wide catalogue of off-the-shelf containers. A brief demo is available here: **https://youtu.be/asxozHcandc**.

The value of community

The annotated learning datasets and the models that can be inferred from them are the cornerstones of Machine Learning applications. To stimulate developments in this field, GARR will grant free access to the platform for a given period of time to users who will agree to share their data and models with the community, thus enabling others to use them as a starting point of their own research. Accessing this kind of resources would be helpful both for those who are new to this application development techniques, who would not have to start from scratch, and for those who are already working on similar problems.

All these features make GARR Cloud Container Platform a one-stop shop, where researchers can find everything they need to start their experiments: 1) computing resources, 2) pre-set software components that can be easily reused and customised, 3) ready-to-use datasets and models that can be used or adapted to new use cases.

With this new tool, we hope to provide the Italian scientific community with a tool to become a leader in the new era of applications, and in particular of AI.

REAL-TIME ASTRONOMY: THE SARDINIA RADIO TELESCOPE IS NOW CONNECTED AT HYPER-SPEED

The data of Sardinia Radio Telescope, the most modern and technologically advanced satellite dish in Europe, built by the National Institute of Astrophysics in collaboration with the Italian Space Agency, are now available in real-time for the worldwide community of astrophysics.

Words
Carlo Volpe, GARR Communications and External Relations

In the first weeks of 2018, Sardinia Radio Telescope (SRT) was interconnected to the ultra-broadband of the Italian Research and Education network and to the international GÉANT network thanks to a 107-km-long optical link. Soon after the link went operational, the radio telescope proved its capacities, in a joint observation carried out on 27 February using the VLBI technique (see box on opposite page), which implies having antennas distributed all around the globe to function together as if they were a single dish as large as the distance that separates the individual antennas. It was not the first time SRT was used in a VLBI observation, but it was the first time with SRT equipped with optical fibre. In a few weeks an even more important test called e-VLBI will be carried out: this time a correlation of real-time observational data will be attempted from many parts of the world simultaneously.

A very advanced infrastructure, now connected to the world

The scientific community had been waiting for this moment for years, as the SRT is one of the most powerful and advanced research infrastructures for the study of radio emissions from celestial bodies and for applications of geodynamics and space sciences. Its adjustable satellite dish is the largest of the three Italian antennas and close to the world's top with 64 metres in diameter. What makes it truly exceptional is the cutting-edge technology that ensures high efficiency in very high-frequency observations. Thanks to a complex system of high precision actuators controlling the 1,000 panels of the antenna, the SRT is in fact able to re-shape its surface to compensate for thermal, gravitational and wind variations, thus achieving levels of accuracy much higher than the old-concept infrastructures. In addition, SRT is able to quickly change the receivers and therefore can move to observations of very different frequencies in the timespan of a few minutes.

"We are very proud of the connection of SRT to our network - said GARR Director, Federico Ruggieri, because we have worked many years to achieve this goal. Once again, the joint commitment between various actors, both institutional and academic, has played a fundamental role in making the most out of this very important national research infrastructure. Thanks to the network connection, SRT can now finally express its full potential and thus make a significant Italian contribution to the big international collaborations".

The SRT is home to scientific instruments and services of both INAF and ASI: in fact, as well as in radio astronomy research, the parabola is used in monitoring and communicating with interplanetary probes, including Rosetta in 2015 and, more recently, Cassini.

Building a research infrastructure of such complexity took twelve years, from the laying its foundations in 2001 to the inauguration, which took place in 2013. From that moment, the astronomical validation started, and the observations. However, the absence of a high-capacity link has led to the inability to use data in real-time, a fundamental feature to ensure the highest possible accuracy of the data from the detectors. SRT is located in the province of Cagliari, in the region of Gerrei at the site of Pranu Sanguni (Municipality of San Basilio), chosen precisely because located far away from inhabited areas and other human activities, that would interfere with the signals picked up by the infrastructure. To connect it, it was therefore necessary to lay an ad-hoc fibre for over 100 km. This was made possible thanks to the commitment of the Sardinia Region, which was on the front line in supporting this project from the outset. It provided funding for the construction of the infrastructure as well as for technological development activities and training.

The fibre link makes a big difference

The ultra-broadband link made possible the first real-time observations from SRT, making a huge leap forward in the use of this infrastructure. Until now the data of the observations were recorded on disks that had to be either transmitted on a 256 kbps satellite link or physically transported to the INAF astronomical observatory in Cagliari and from there sent to the processing centres. In addition, the benefits in simplifying data management and in facilitating data protection against accidental loss, the fibre optic connection enables the correlation with other infrastructures for joint observations and the calibration and immediate correction of errors, an aspect that can really make a difference, considering the uniqueness of many astronomical events.

The optical link has the capacity of 1 Gbps and enables the interconnection of the dish to the entire international NRENs, thanks to the link with the European high-capacity backbone GÉANT. By this summer, the connection will be further expanded up to 10 Gbps, to ensure maximum performance and accuracy of observations. Thanks to the quality of the line, the overall signal attenuation on the 107 km section is low, so as to enable the transmission of the optical signal without the need for intermediate amplification, therefore with higher levels of service.

With this link, the SRT can also be used together with other Italian infrastructures, in particular with the two radio telescopes of Noto and Medicina (Bologna) and also with the European and global ones, through the e-VLBI network.

E-VLBI: Astronomical data in real-time

The VLBI technique (Very Long Baseline Interferometry) allows to combine the simultaneous observations of different radio telescopes, emulating a telescope with a size equal to the maximum separation between the telescopes. In this way, the more the antennas are distant, the greater the virtual radio telescope obtained and the resulting data resolution. In the case of the e-VLBI (electronic-VLBI), thanks to the ultra-broadband link, the observations are also made immediately available to the astronomers, without any delay for the reconstruction of data.

BELNET: DEDICATED CONNECTIVITY SINCE 1993

The Belgian research network is celebrating its 25th anniversary this year. Over the past 25 years, Belnet has developed into a public service under separate management with 75 employees and more than 200 connected organisations – altogether serving more than 800,000 end users. Below is an overview of Belnet's most important historical milestones.

In 1993, Belnet was established as a research programme within the Belgian Science Policy Office and became Belgium's first internet provider. Since then it has never relinquished this pioneering role, and to quote Jan Torreele, Director of Belnet: "For example, in 1997, Belnet was the first to offer IPv6 in an experimental phase, while it was only rolled out globally 15 years later."

The Internet really took off in 1998. Internet companies were popping up everywhere. That was anything but an easy period for Belnet. All the expertise was bundled at Belnet yet many of the employees left to go work for private players. However, as a result of the Internet crash in 2000, Belnet would later welcome back many of those employees with open arms.

There was also another reason to celebrate after the Internet crash. Jan Torreele: "We ultimately won the fight against broadband because the capacity of our backbone rose to 10 Gbps. After periods in which we were constantly overtaken by developments, the network capacity finally met the needs of the connected organisations."

From that point on, Belnet could focus on further improving its own operations, especially in terms of security. Belnet spent the period from 2004 to 2011 in consolidation. It concluded partnership agreements whereby higher education institutions could get cheaper, better access to the Belnet network. It also established a Service Desk that customers could contact 24/7.

Jan Torreele: "We also installed approximately 2,000 km of dark fibre, which we manage ourselves. In addition to this, our mission was expanded by law in 2009. From that point on, we also received official assignments to provide our services to public authorities. This was actually the request of the public authorities themselves. We also apply in the R&E sector, the knowledge we have built up from our services to public authorities. This results in cross-fertilisation between the two communities."

Another milestone was the complete renovation of the optic network in 2014. Thanks to this, the connected institutions can now take advantage of a state-of-the-art network with a capacity of 100 Gbps.

Trusted partner

Customer satisfaction surveys carried out by Belnet show that the connected organisations do not regard Belnet purely as a supplier, but as a real partner that works together with them. "We want to remain a trusted partner in the future too. We work continuously to further improve the quality of our service, as our customers depend on a permanently available connectivity. Operational excellence and the further professionalisation of our organisation will therefore be our main aims over the next five years," concludes Jan Torreele.

Words
Davina Luyten
Belnet

CANARIE NATIONAL SUMMIT TO FOCUS ON OPPORTUNITIES FOR CANADA IN AN *AUTOMATION NATION*

2-3 October, Ottawa, Ontario, Canada

CANARIE's National Summit draws stakeholders from across the innovation ecosystem and provides them with a preview of Canada's digital future. The National Summit provides guests with an opportunity to celebrate innovation, and to identify and act on emerging opportunities to strengthen Canada's digital economy.

The 2017 National Summit drew leaders from across Canada to hear speakers on the theme of Science, Commerce, Security: Connected. The profile of attendees, together with high quality speakers, resulted in an event with a strategic focus on how public and private sector partners can work together to position Canada for leadership in the global digital economy. One of the ways we tried to ensure our guests had a memorable experience was to have an artist onsite capturing key insights over the course of the two-day event. You can see in this image (right) what she captured.

Our National Summit theme in 2018 is Automation Nation, and speakers will highlight the transformative effects of automation across research, automotive, medical, manufacturing, legal, and education sectors – and how human systems are evolving to manage the economic, social, and ethical impacts of this change. The format of the conference is plenary sessions, so guests have a common experience and plenty of opportunities to network and discuss the ideas and themes presented.

We welcome our global NREN partners to Ottawa on 2-3 October! To ensure you learn more about this year's Summit, subscribe to CANARIE news at **canarie.ca/newsletters/** and visit **canariesummit.ca**.

UPGRADING THE JANET NETWORK

The UK's Janet Network is the busiest National Research and Education Network (NREN) in Europe, currently carrying over 1.5 petabytes of data each year - it's also one of the fastest. This summer, it's getting an upgrade.

For more than 30 years, the Janet Network has underpinned the UK's research and education sector and it's a key service that Jisc now provides to the country's universities, research centres and further education colleges, as well as several science parks, public bodies and alternative education providers.

Throughout that time, traffic across the network has doubled every 18 months to two years, as more organisations have joined and as our members' computing needs have become more complex and resource hungry. And in the last handful of years the rapid development of open science, an increasing reliance on cloud services and external data centres and the growing use of personal mobile devices, have all started to place more demands on NRENs.

To ensure that Janet Network users are assured of having the computing power, security and responsiveness they need long term we have invested consistently in service development, completing the last major upgrade in 2013. The next phase, already under way, will take three to five years.

Boosting the bandwidth

The first results will be apparent much sooner, however, as we boost the bandwidth in the coming months. The Janet Network already operates at 400Gbit/s capacity in places, using 100 Gbit/s technology; the new work will take this to up to 600 Gbit/s and employ Ciena's new 400 Gbit/s technology, powered by WaveLogic Ai coherent optics. This will help us to ensure that we can operate efficiently and engineer the network to manage the massive surges in data flow that many research activities now generate.

Consolidating the infrastructure

To prepare for the latest upgrade we have taken steps to consolidate the network infrastructure, which until two years ago consisted of the backbone and 18 regional networks managed by different groups of universities. By bringing the operation of the regional networks in-house we have centralised control and over the next few years we'll replace those regional networks, reducing overall running costs and creating a more robust, unified architecture so that the Janet Network can deliver new services and service improvements to users quickly and flexibly.

The resulting more coherent infrastructure will make it much easier to deploy services end to end and to implement new technologies in a more agile way, whether that's automating much of the network provisioning or virtualising network functions, such as end users' firewall services.

In 2017 a university asked us to work with them to implement Microsoft Azure using the Microsoft ExpressRoute connectivity service. We've accomplished this successfully but the existing regional infrastructure made it quite a challenge. The rebuild will give us the capability to deploy this kind of service much more quickly.

We're pushing ahead with all these initiatives as speedily as possible to ensure that the Janet Network continues to deliver its 'mission critical' service to the UK's research and education sectors and also to fulfil its role as a member of the wider GÉANT community.

Security and assurance

We're focused on delivering a reliable, secure network that protects Janet Network users from cyber crime and from increasingly common and sophisticated denial of service attacks.

To achieve this, we've created a new cyber security division and dedicated security operations centre. Over the last 12 months we've recruited more specialist staff to the division and enhanced services such as our distributed denial of service (DDoS) mitigation to enable members to see suspicious traffic on their network in real time. When this enhancement is fully rolled out it will cut response times to such attacks to just a few minutes. We've also added new initiatives such as a simulated phishing and awareness service in response to our members' serious concerns over the security dangers that phishing represents; the service is helping our members to educate their own network users about how to spot phishing threats.

At the same time, our network users need to be assured that sensitive data is being managed and transferred between users in a secure and appropriate way, whether it's research data or personal student information being used to improve teaching delivery and learning outcomes. We've collaborated with a number of leading UK universities to provide higher assurance connectivity over the Janet Network and robust access management mechanisms between research centres.

Business as usual

Crucially we'll achieve this summer's boost to the bandwidth seamlessly, without loss of service or disruption to network users. The benefits of the bandwidth enhancement will be felt straight away and, as the upgrade programme continues, more advantages will become evident. This is our opportunity to build resilience, embed tools to protect the network and network services and improve our ability to deliver new services speedily and efficiently.

Find out more

Read more about the Janet Network: **https://www.jisc.ac.uk/janet**

Take a look at this news story about our cyber security work over the past year:

https://www.jisc.ac.uk/news/cyber-security-in-2017-how-we-made-our-defences-stronger-03-jan-2018

Words
Charlie Covington
Jisc

RENATER CELEBRATING 25 YEARS SERVING RESEARCH AND EDUCATION

Created in 1993, the French Research and Education Network RENATER is managing its own fiber network, providing IP and Layer 2 connectivity to more than 1400 sites located in France and overseas territories in the Atlantic and Pacific oceans. When speaking about the high bandwidth and resilient backbone, Patrick Donath, RENATER CEO, says with a smile that "the sun never goes down on RENATER network".

Moreover, since 2015, RENATER is also successfully providing some of its fibers to the French Inter-ministerial network, then optimising state expenditures.

On top of the network, RENATER strategy for 25 years has always been to work together with Research and Education, answering their specific needs and innovating services for a secured and reliable digital transformation. In 2016 RENATER received a Public Partner Award for enabling online exams for medicine students. RENATER's portfolio is always evolving, embedding security and authentication features at design phase.

But RENATER's story of the past decades is also strongly linked to GÉANT's. Involved since the early ages of DANTE and TERENA (now the GÉANT Association), RENATER has been an active partner in building the pan-European network, both at governance levels and as part of the series of European projects co-funded by the EU.

As Sabine Jaume-Rajaonia, RENATER Strategy director and member of the GÉANT Board recalls, "we are stronger together!" Research and Education networks are a fantastic asset to our Research and Education community, and RENATER is – since 2011 when signing a MoU with WACREN – very involved in helping this area of Africa to build its own NRENs and Regional backbone.

Sharing experience and providing expertise is also part of RENATER missions. At a national level, RENATER is organising the JRES conference (www.jres.org) every two years since 1995, now reaching more than 1700 participants, making it a huge think tank open to Universities, High Schools, Research centers, but also other NRENs and Industry.

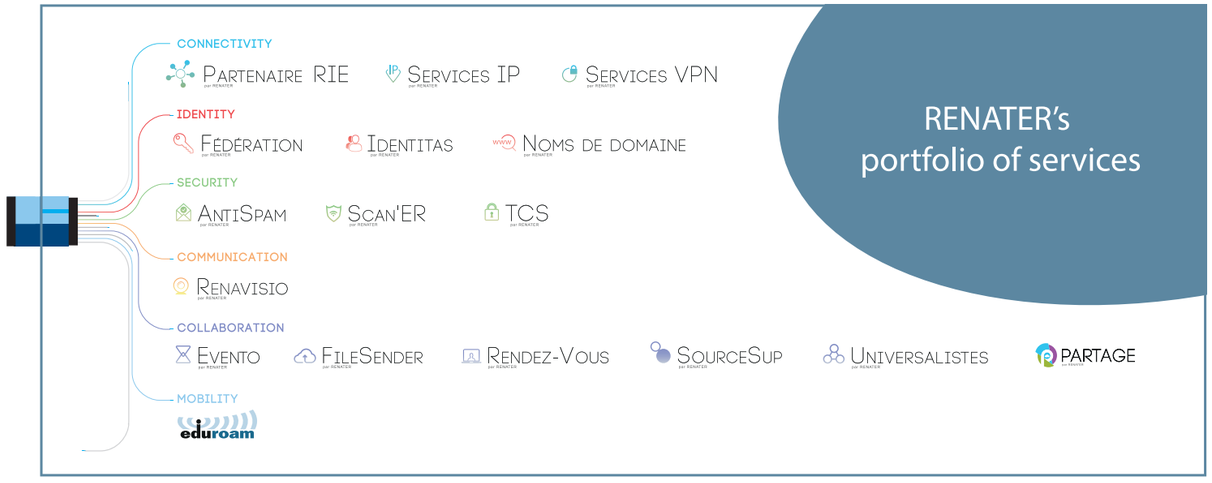
RENATER is quite proud of these 25 years serving our Research and Education community, for the Best and the Excellence!

More on **www.renater.fr**

Words
Virginie Blanquart, RENATER

Pictures
Main: RENATER network connecting French R&E sites

Right: WACREN and GÉANT on the RENATER stand at JRES



STRONG TIES TO SUCCESSFULLY COMBAT CYBERCRIME

Intelligent and networked devices and applications are now an indispensable part of our professional and private lives. The drawback to this is that cybercrime has become an extremely lucrative business. In future, we can only successfully defend against this if local security competence centres such as SWITCH-CERT work closely together with a high degree of trust, both nationally and internationally.

There is one issue on which users, companies and cybercriminals agree: increasing digitalisation offers unforeseen opportunities. In addition to all the benefits of limitless access to information, we are also experiencing the unwanted consequences to an ever greater extent. Low-quality hardware and software leads to an increasing stream of vulnerabilities that are difficult or impossible to remedy. Sophisticated, targeted and regionally focused attacks culminate in vast amounts of stolen data and billions in losses for those affected.

Asymmetry favouring the attackers

Meanwhile, the estimated damage caused by cybercriminals in the Western world has outstripped that of crime in the physical world. The more added value is shifted to the internet, the more lucrative their criminal business model becomes. In addition, the attackers enjoy great advantages over their victims and law enforcement in the virtual world:

- In a highly complex world, there will always be inattentive people and technical vulnerabilities
- Attackers operate globally without having to be present locally
- Attack models can be multiplied billions of times with minimal effort, while each attack must be fought off individually
- Attackers do not care about jurisdictions, but work together in dynamic value creation chains worldwide. Law enforcement across jurisdictions, on the other hand, is very complex, slow and expensive
- If a perpetrator is caught, judges often don't pass sentence due to outmoded legal bases and a lack of specialist knowledge

Only collaboration leads to success

If you analyse the challenges in IT security, you inevitably come to the conclusion that the key to sustainable success lies in inter-institutional collaboration. No IT department in the world will ever be able to go it alone against the risks of cyberspace. In addition to the implementation of preventative measures, which has long been practised, reactive skills such as the detection of attacks, incident response and the associated acquisition of relevant threat intelligence are becoming increasingly important. There are two basic requirements for well-coordinated national and international collaboration: personal trust and close relationships. These can't be bought: they have to be built up and maintained over many years. A CERT is thus not only a committed team in itself; the various CERTs and professional organisations worldwide work together in the same way.

With over 20 years of systematic work and active participation in international organisations such as TF-CSIRT, FIRST, CENTR and GÉANT, SWITCH-CERT has built a unique international contact network for Switzerland with a high degree of trust, one which creates huge added value for all customer groups. Together with national competence centres such as MELANI and fedpol, we continually optimise this collaboration and accelerate information flows. We have thereby succeeded in utilising Switzerland's limited resources to their fullest extent, true to our conviction that close national and international collaboration with a high degree of trust is an essential prerequisite for successfully combating cybercrime.

Global relationships provide local benefits

SWITCH-CERT is part of a worldwide knowledge and alert exchange network. Relationships with international CERT communities have been systematically built and deepened over the course of 20 years. This global relationship network cannot be readily copied. The same is true for collaborations on a national level in the interests of national IT security.

For example:

- Longstanding collaboration with OFCOM and law enforcement authorities as part of our registry activities. This shows that even in a small country with limited resources, it is possible to operate a critical infrastructure on an internationally leading level
- Close coordination and collaboration with the Reporting and Analysis Centre for Information Assurance MELANI (GovCERT for Switzerland)
- Involvement in the implementation of the national strategy for Switzerland's protection against cyber risks, adopted by the Federal Council in 2012. SWITCH supports the federal government in the sphere of action 5, 'International relations and initiatives', for measure 11, 'Coordination of all those involved in initiatives and best practices in the area of safety and security processes'
- Involvement in the Swiss Security Network (SSN), a joint platform from the federal government and cantons for collaboration in the area of security
- Involvement in a working group for the federal expert group 'Future of data processing and data security'
- Involvement in the cybersecurity platform of the Swiss Academy of Engineering Sciences (SATW)
- Founding member of the Swiss Internet Security Alliance (SISA)

For many years, SWITCH-CERT has been using its security expertise and experience in the management and moderation of trusted communities for the benefit of the university community, internet users and the Swiss economy, with considerable success. Collaboration with SWITCH-CERT opens up a high-calibre network of relationships for its customers, providing invaluable services in the fight against cybercrime.

Words
Martin Leuthold, SWITCH

FOCUS ON CYNET

You may have heard about Cyprus as a popular holiday destination with the most sunny days every year, but Cyprus also has a dynamic research and education sector with 10 major universities, as well as several colleges, research institutions and dynamic innovative companies. Moreover, Cyprus participates in Horizon 2020 with 245 programs, attracting a total funding of €106.65 million. This makes Cyprus the number one participating country in the largest funding program for research and innovation in Europe.

Words
Silvie Francisci, Partner Relations Officer, GÉANT

Pictures
Left; Dr. Georgios Konnis

Right; CyNet topology

CyNet has been a part of the GÉANT community since 2000 with a current connectivity to GÉANT of 2x2Gbps to London and Frankfurt. In addition, CyNet has been able to secure a connection of 1Gbps to Athens resulting in faster connectivity to Greece. GÉANT's positive response to CyNet's request will benefit CyNet's members, since the majority of their distance learning students are from Greece, and this new connection will definitely minimise traffic latency. Furthermore, CyNet is providing several GÉANT services like eduroam, TCS, FoD, NSHaRP, MD-VPN, Cloud, etc. and is in the process of deploying eduGAIN. CyNet is also a partner in international research projects like EaPConnect and EUMEDCONNECT3.

Investing in dark fibre

In 2017, after the decision of the Republic's Council of Ministers, CyNet received significant funding from the European Structural and Investment Funds in Cyprus, for the implementation of dark fibre in the network in Cyprus. The aim of this project is to connect all CyNet's members (universities and research institutions) to dark fibre.

CyNet aims to make the best use of the new circuits and, to this end, it is working on a series of projects, such as the interconnection of schools and hospitals, as well as the development of new services such as telephony.

CyNet, counting only 4 permanent staff, puts a huge amount of work into setting up and leading these activities and is interested in offering more services via the GÉANT network in the future.

AAI Developments

GÉANT is supporting CyNet with eduGAIN training and knowledge transfer and in particular, working with Federation as a Service (FaaS) as part of eduGAIN. CIF (CyNet Identity Federation) is the federation of Cyprus. However, whilst CyNet is a voting-only member of the eduGAIN community and there is no federated access in Cyprus yet, development is in progress. At the moment GRNET is assisting CyNet in deployment of the service. To this end, a first webinar for CyNet's members was organised on 19 April, which was an introduction to the main aspects of the service. This was followed by a hands-on workshop, where our members were trained on how to set up an IdP or SP.

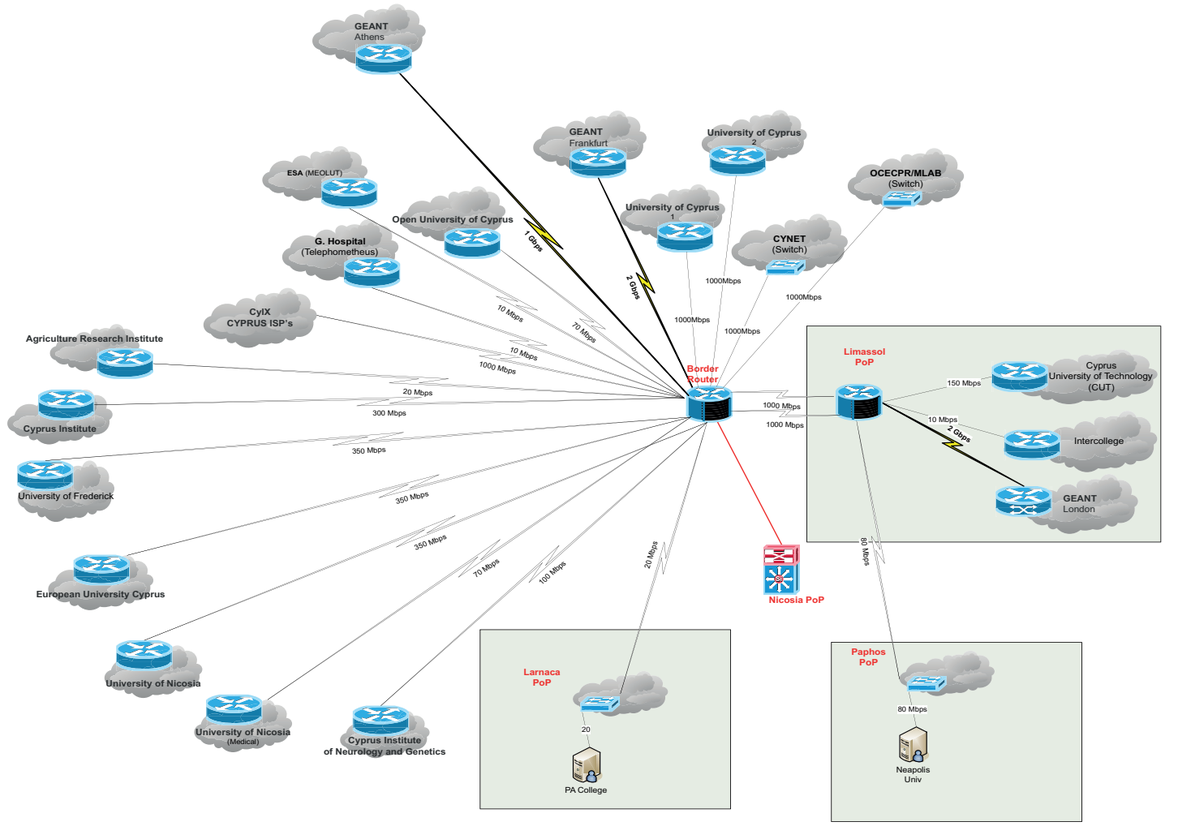
Future Talent to support R&E networking

Last year two CyNet students became part of the inaugural TNC17 Future Talent programme in Linz, Austria. Cypriot students submitted four proposals and two students were selected to participate in TNC17. Rafay Ansari, a Computer Engineering student from Frederick University recognised the mentoring part of the future talent program as very beneficial to him: "I especially liked the mentoring part. I am a Ph.D. student and for my research I have to do a lot of presentations and talks, so this is helping me tremendously."

Exciting new CSIRT developments in Cyprus

In 2010 CyNet was appointed as the Academic CSIRT of Cyprus. While the project did not progress then due to lack of funding, a proposal was submitted in 2017 and funding has been granted through the CEF (Connecting Europe Facility).

Specifically, CyNet in collaboration with OCECPR, the Telecoms Regulator in the Republic of Cyprus (2nd partner in the proposal), were selected for the funding with the action '2017-CY-IA-0121: Establishment of Cypriot Academic CSIRT', under the 'Connecting Europe Facility Call for proposals: CEF Telecom Call 2017 CEF-TC-2017-2'. The main objective of the action is the design, installation, configuration/customisation and support of all necessary infrastructure for implementing the Academic CSIRT.



Upon completion and as a next step, the action aims at improving the capabilities of the developed Cyprus Academic CSIRT by providing an appropriate connection to the already implemented infrastructures of the other existing CSIRTs in Cyprus (National CSIRT and Governmental CSIRT). CyNet, in its capacity as an NREN, and under the umbrella of GÉANT, aspires to connect to other 'sister' NREN CERT/CSIRT teams. Initially, CyNet will establish a connection with the teams formed by GRNET and FORTH in Greece, and subsequently to more teams from the same network.

Managing Director Dr. Georgios Konnis addressed some questions to give a deeper understanding of CyNet.

As a newly appointed director of CyNet and being in the research and education community for more than 25 years as Research Assistant Professor at NTUA, researcher in universities and private companies and spinoffs in various countries, what are your key areas of focus for CyNet in the next couple of years?

The focus is on the transformation of CyNet into a modern autonomous organisation. Our main objective is to be able to provide all infrastructure and services to the Research and Academic Institutions and thus contribute to the creation of a Springboard of Innovation in the Republic of Cyprus.

What new parts of the Cypriot research and education community would you like to approach and engage with more?

We wish to get more engaged with schools, hospitals and innovative companies carrying out research work and participating in research projects, so as to provide an integrated connection of all research organisations. For example, the Library of the Republic's House of Representatives will soon be connected to our network, in order to provide support to researchers involved in legislative matters.

How would you value the cooperation with GÉANT so far? How can GÉANT support you in your further activities in the research and education community?

Excellent cooperation! CyNet's presence and furtherance is largely based on its participation in GÉANT. GÉANT's response to our needs is immediate and, through the NREN's support program, CyNet has come to expand and upgrade its services. Additionally, the extra resource provided for the IaaS offers CyNet the ability to develop the cloud service. Through GÉANT we have received training not only on know-how issues but also on issues such as business development. Through such a productive cooperation CyNet will definitely progress and expand, and consequently will be more beneficial to its members.

"We are a lean, knowledge-based, forward-looking, dynamic, organisation, strongly committed to enhancing our knowledge and realising our mission to provide integrated connection of all research organisations. With the help of GÉANT we aim to materialise our vision to facilitate and Springboard Innovation in the Republic of Cyprus as a trusted partner of the research and innovation ecosystem and a regional hub."

Dr. Georgios Konnis

For further information, please contact **partner-relations@geant.org**

GÉANT DDOS DETECTION AND MITIGATION – SUPPORTING R&E NETWORKING AGAINST EXTERNAL THREATS

With increasing numbers of individuals and groups attempting to disrupt networking services and the proliferation of automated and "shrink wrapped" attack tools that can be disseminated across both owned and botnet hijacked resources, the threat of disruptive attacks is increasing hugely.

The proliferation of Distributed Denial of Service (DDoS) attacks means that both commercial and R&E networks need to place an increased effort on the design and construction of a successful detection and mitigation systems. Within the GÉANT community we have both the advantages of highly skilled teams across Europe but also the disadvantage of a highly distributed networking infrastructure managed by many different organisation. Therefore the GÉANT Network Security Task has operated through several generations of GÉANT projects to support and co-ordinate a consistent detection and mitigation strategy and has yielded a comprehensive Firewall on Demand (FoD) tool which is now complemented with other tools and solutions to form an integrated DDoS detection and mitigation system.

The latest development of FoD and the DDoS detection and mitigation system is FoD [FLOWSPY]. This service adds support for (semi-)automated rule proposal to the previous FoD implementations which enhance the manually entered mitigation rules through the web interface. In this way NREN NOC administrators will be able to access automatically generated proposals for mitigation rules created out of Network Security Handling and Response Process (NSHaRP). This new feature of FoD makes the process of entering and applying the rules faster and easier whilst the final decision regarding what rules to apply is still up to the users.

Firewall on Demand (FoD) is a solution for a mitigation of large-scale network attacks, such as Distributed Denial of Service attacks. FoD is based on BGP-FlowSpec to allow normally routed GÉANT IP traffic to be filtered, based on the administered BGP FlowSpec rules [rfc5575] [rfc7674], thus preventing the attack to the protected network.

FoD within the GÉANT core network allows users (NREN NOC administrators) to administer BGP FlowSpec rules via a web interface. This interface is capable of crafting, disseminating or withdrawing FlowSpec rules 'on demand'. FlowSpec is preferred rather than older DDoS detection and mitigation tools such as access control lists (ACLs) and remotely triggered blackhole (RTBH) filtering, because it is faster and enables greater granularity of firewall rules.

https://geant.org/Networks/Network_Operations/Pages/Firewall-on-Demand.aspx

NETWORK MANAGEMENT AS A SERVICE – SIMPLIFYING NETWORK MANAGEMENT ACROSS THE COMMUNITY

Today's networks are complex heterogeneous network infrastructures with increasing numbers of value added services and features. These services are becoming mission critical and end users are expecting effective, end-to-end monitoring and management.

However, the cost and complexity of developing and integrating in-house network management may be too high for many NRENs and Institutions – hence the GN4-2 project developing the Network Management as a Service (NMaaS) platform.

NMaaS aims to support NRENs to provide an effective, efficient network and service management platform. NMaaS simplifies domain network management by providing the infrastructure and tools via a cloud-based, multi-tenant and secure network management system. It enables management and monitoring of client networks through on-demand deployment of network management tools in the cloud infrastructure. Using a multi-tenant approach, each NREN or Institution has private access to their network and services from a highly available cloud-based platform.

The NMaaS service consists of three components.

- The first component includes providing, managing and maintaining the infrastructure of the NMaaS portal, platform and selected tools.
- As a second service aspect, NMaaS provides support to users in using the system and the tools they select for monitoring their networks via NMaaS.
- The third component entails user support, when contributing their software to NMaaS portfolio.

Although the initial set of tools is focused on network monitoring, the system itself is created to be flexible enough to accept the integration of any tool needed.

Who is NMaaS for?

NMaaS is ideally suited to small and emerging NRENs. These smaller NRENs may have limited resources to develop their own network management systems by using a shared and supported platform, NRENs can focus on the monitoring and management of their service components

Smaller institutions and organisations can also use NMaaS as it is ideally suited to support the needs of institutional users. In addition, distributed research projects could use a managed platform to enable them to focus on their core research and development activities.

NMaaS can be delivered either on an NREN managed NMaaS platform or a centralised GÉANT platform. The modular nature allows separate user groups to select their own subset of tools and configurations to support their particular needs.

NMaaS has three key benefits for users

- **Plug and Play** - The cloud based platform reduces start-up costs and management overhead
- **Private** - Each management instance is separated within the platform by design to maintain isolation. This allows institutions and projects to manage separate infrastructures securely
- **Secure** – NMaaS uses VPN technology to incorporate management platform instance into network instance with all monitoring and management occurring within the secure VPN structure.

For more information about the service and how to join – contact: **NMaaS@lists.geant.org**.

GÉANT SOFTWARE CATALOGUE AS A CODE PORTFOLIO

GÉANT is a big community of talented software teams. There are more than 30 software projects being developed by around 20 software development teams of highly skilled professionals originating from different partner NRENs. The many projects already completed have resulted in lots of reusable pieces of code. This constitutes an impressive community portfolio.

The question is, how can we get to know it? The answer is through a project's repository – a place where essential information about GÉANT development efforts can be found. This includes a few words of description, contacts, roles, community, communication channels, resources and many other elements that are necessary to comprehensively describe software related initiatives. Such repositories exist in all large software communities and the GÉANT/NREN community does definitely fit this profile. A central and complete software data repository is a must-have feature for a federated community of software developers, to maximise the benefits of collaborative work and alleviate some negative effects of distributed teams and projects.

The GÉANT Software Catalogue is a web-based service delivering an overview of all GÉANT software development in a clear and comprehensive way. It does not introduce yet another information repository by duplicating existing records - rather it retrieves the data from existing sources consolidating the information in a unified and customised way. The Software Catalogue supports information retrieval from data sources as Jira, Git, GitHub, GitLab and this list is continuously growing.

The catalogue supports multiple roles and types of users, including code contributors, software architects, auditors, testers, coordinators, project managers, product owners and activity/task leaders. Teams are able to look for available resources, existing solutions and any other teams doing related work or having specific competencies. In this way, the catalogue supports experience and knowledge exchange as well as cooperation opportunities. Managers and coordinators get an overview of GÉANT software development as a whole with the ability to search for trends or patterns.

It is expected that in the long-term the Software Catalogue will deliver extra value in the form of improved software development governance (better resources assignment and higher value of developed products) and reduced costs of software development.

The GÉANT Software Catalogue is in a pilot phase at the moment and will be transitioned into production in Autumn 2018. It is a joint effort of PSNC and AMRES as part of the GÉANT SA2 Activity. An operational instance is available at **sc.qalab.geant.net**. Once live it will support federated authentication and will complement the existing GÉANT toolset.

The Software Catalogue is driven by the user community and the SC development team is open to feedback and recommendations from the community. Please send any messages to Maciej Łabędzki, SC Team Leader in SA2 T1, **labedzki@man.poznan.pl**

Words
Maciej Łabędzki and Marcin Wolski of PSNC

The scientific/academic work is financed from financial resources for science in the years 2016 - 2018 granted for the realization of the international project, co-financed by Polish Ministry of Science and Higher Education.

[1] https://projects.apache.org/

FIRST TWO EYR INDIA2EUROPE AWARDS ANNOUNCED

Enlighten Your Research (EYR) is a science support programme designed to bring technological solutions into research workflows across a wide range of disciplines – from climate science to humanities.

EYR fosters international cooperation and taps talent, as successfully demonstrated in previous programme editions, such as EYR@EaP, which focuses on unleashing potential in the Eastern Partnership countries.

ENLIGHTEN YOUR RESEARCH
INDIA2EUROPE

National Knowledge Network
GÉANT

Focus on India-EU

GÉANT and its Indian counterpart NKN – two of the largest R&E networking organisations in the world - have joined forces in the 1st edition of EYR-India2Europe to help accelerate research collaborations between Europe and India through improved networking, data transfer, engineering and match-making.

Scientists were invited to submit research projects that could benefit from access to advanced networks and technology as well as to consultation with expert engineers to help improve research workflows. They were further challenged to stretch their boundaries and to work with peers in other countries to perform experiments facilitated by the underlying R&E network infrastructure, services and support.

And the winners are...

The 2018 EYR-India2Europe call closed on 7 February and the selected projects have now been announced:

- **Orchestrating High Performance Computing (HPC) Based Web Services for Rapid Analytics: A Framework for Disaster Monitoring** sets out to establish a rapid disaster response system by orchestrating relevant standardized domain-specific web services in a high performance computing environment.

  Research areas covered within this project are rapid disaster assessment, remote sensing, high performance computing, and IaaS. Furthermore, the proposal deals with Open Geospatial Consortium standards, web processing services, and service orchestration.

  Project partners are the Indian Institute of Technology Bombay and Geolabs in Montpellier, France.
- **With focus on agriculture, Cloud Crop Simulation (COCOSIM)** aims to integrate a crop simulation model on cloud. The researchers set out to demonstrate the utility of high-bandwidth connectivity for course correction of model assimilates by using remotely sensed data and to utilize cloud resources to share knowledge, best practice and make multi-media based learning modules on disruptive technologies with focus on agriculture available.

  Partners in this project are the Indian Institute of Information Technology and Management Kerala, the Indian Institute of Space Science and Technology (IIST), the G.B. Pant University of Agriculture & Technology in Pantnagar; on the European side: the Ecosystem Modelling Working Group at the Leibniz Centre for Agricultural Landscape Research (ZALF) in Müncheberg, Germany.

Project work will start in earnest in June 2018. Preliminary results of their work is expected to be presented at this year's NKN Conference in autumn as part of the EYR award ceremony.

The award winners will receive:

- Connections to e-infrastructure resources in Europe through collaborations with universities and research institutes.
- Customised support and advice on the use of network services and end-to-end network connectivity.

THE CONNECT INTERVIEW:

LUZ MIRIAM DÍAZ PATIGÑO

Luz Miriam Díaz Patigño was recently appointed CEO of RENATA, the Colombian NREN. In conjunction with the celebrations of RENATA's 11th anniversary, CONNECT caught up with Luz Miriam to talk about her plans for the NREN in the coming years and its role within the global Research & Education community.

Pictures
Left and Right; Luz Miriam Díaz Patigño, CEO of RENATA

Miriam can you tell us what excites you about leading RENATA?

Today RENATA is a powerful mix of knowledge, experience and advanced technology for the country's scientific and academic community. I believe that our network is an important source of progress for Colombia. We are excited about the challenges ahead and are confident that our infrastructure and its technology will enable us to face them. RENATA offers the ideal setting for the development of multidisciplinary projects that will contribute to the growth and development of our country.

I believe that at RENATA we have all the necessary tools and services to address the needs of universities and research institutions in Colombia and need to ensure that industry, academia and government organisations in our country use our network effectively for national and international collaborations.

We are also thrilled that our Government – particularly the Ministry of Information Technology and Communications, the Ministry of National Education and the Administrative Department of Science, Technology and Innovation - Colciencias, jointly with other local academic networks such as RADAR, RIESCAR, RUTA Caribe and UNIRED, support RENATA's management and appreciate that our NREN can be one of the driving forces of Colombia's digital economy.

This year has marked the celebration of RENATA's success in the past 11 years, what are your plans for the future?

A couple of years ago, RENATA's Board of Directors, in line with the principle that "only countries that invest in science and education move forward", decided to reinvent RENATA: this implied strengthening both its infrastructure and systems. Today, our NREN offers advanced connectivity and new services and hopes to create a setting conducive to knowledge growth and stimulation.

We have two milestone objectives. Firstly, to connect to our network, research and education institutions in Colombia, as we hope they will become our network evangelists. By 2020 we aim to bring to over 500 (from today's 120)

the number of organisations connected to our network

Secondly, to strengthen our ability to coordinate the implementation of collaborative research and education projects with national and international remit, focussing on innovation, productivity and the environment.

What does it mean for RENATA to be part of RedCLARA and the global R&E community?

Being part of RedCLARA is one of our main strengths; thanks to this alliance we can connect with the global academic network and more than its 18,700 affiliated institutions around the world.

Our slogan is "RENATA connects you to the global academic network!". Connection with the scientific world is undoubtedly one of the main advantages RENATA offers to Colombia as it opens for our researchers, international collaboration areas where it's possible to utilise all the resources of the extended global R&E network, which is indeed our main source of inspiration and motivation.

Jointly with RedCLARA and the other NRENs in Latin America we will be strengthening the collaborative work within each country, the region and the rest of the world. It is our priority to reinforce ties with Europe and the United States: our country and region's 'natural' strategic partners.

Working with RedCLARA in high-impact intercontinental projects is directly linked to priority and importance we give to services such as eduGAIN and eduroam; in fact we are aware that our country's academic community could not enjoy such exclusive services, if it wasn't for this fruitful collaboration.

What is the involvement of RENATA in the forthcoming TICAL conference due to take place in Cartagena de Indias next November, what does it mean to RENATA?

For the second time, RENATA, in partnership with RedCLARA, will host TICAL, the most important conference in Latin America for senior and IT management from academia. Our organisations make up TICAL's programme and organising committee.

For Colombia, and for RENATA, this will be a wonderful opportunity to promote a space for knowledge and collaboration between the strategic ICT actors from academia and all the other NRENs

In 2013, more than 400 ICT leaders from Latin American institutions attended TICAL. This year we hope to achieve the participation of 600 ICT leaders in the region, and increased participation of ICT leaders from Europe and the United States.

We look forward to welcoming you in Cartagena, Colombia, in September!

To find out more about TICAL, visit **http://tical2018.redclara.net/index.php/en/**

TAPPING THE POTENTIAL OF THE ASIAN R&E COMMUNITY

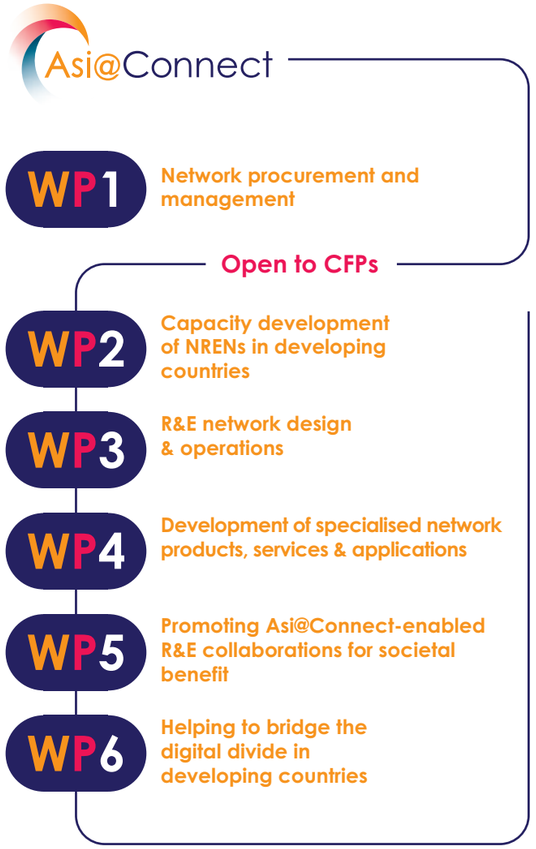
Asia@Connect marks the 4th phase of EU funding to the TEIN programme that successfully established a high-capacity regional network across Asia-Pacific in 2006 and has progressively expanded its geographical footprint over the years. Today the TEIN network is the world's largest regional backbone, connecting over 55 million users in 21 countries.

With a further substantial five-year EU-funding commitment of €20M until 2021, the focus during the current project phase has shifted towards capacity building, application programmes to promote and increase network utilisation and towards new initiatives to tackle the digital divide in emerging countries – scaling up significantly similar activities initiated during previous project phases.

The winning formula: Call for Proposals

Creating such a vibrant R&E networking ecosystem relies on involving the wider community in delivering and, by extension, benefitting from Asi@Connect. But how can local resources best be mobilised? Simple: providing funding opportunities through Call for Proposals (CFPs).

To date, 2 CFPs were issued in 2017, which were met with an enthusiastic response by the R&E community in Asia and further afield: in total, 114 proposals were submitted and, following a rigorous evaluation process by the Asi@Connect review committee, 29 awards were made across 5 of the 6 Work Packages (WP) that capture the core impact objectives of the Asi@Connect project, with a substantial funding investment of over €5m so far.



1st call

52 proposals submitted

12 awarded

2nd call

64 proposals submitted

17 awarded

investment

over €5M

training

over 200 engineers

from 17 Asian countries

Picture
Participants in AfgREN workshop in in Kabul, July 2017

Unleashing (creative) potential

And the results to date are impressive.

- The 1st CFPs generated a series of **human capacity building and knowledge exchange workshops** which have already trained over 200 engineers from 17 developing Asian countries in areas such as campus networking, network security, network management etc. These include workshops in Afghanistan to support the development of AfgREN, the Afghan NREN.
- AARNet (Australia's Academic Network) is leading a project to **extend the eduroam footprint in Asia**, training network engineers from 9 new participating countries to provide them with the skills they need and ongoing support in order to deploy and manage eduroam in their home countries.
- Dr Shimizu and his TEMDEC team at Kyushu University Hospital in Japan endeavour to **scale up telemedicine activities** in the least developed Asian countries, whilst the Korea-based Next organisation is dedicated to providing the **expertise for a vibrant e-culture community** to flourish in South and South-East Asian countries, such as India, Bangladesh and Vietnam.
- By the end of this year, ICT4D in Nepal is committed to **extending broadband internet services to rural communities in the Mt. Everest region**, thus providing remote learning and tele-consultations at local schools and hospitals.
- Finally, Soundscape – a Taiwan-led project – sets out to use the TEIN network to transmit acoustic data for **ecological and biodiversity monitoring** across South-East Asia.

"My motivation to participate in this workshop was to acquire new skills to optimize our contributions to the Institute and, therefore, to increase its reputation. Interacting with other engineer colleagues and meeting experts face-to-face is a great learning experience. I have already started to put by new knowledge around routing and switching into practice back home."

Abdul Ahmad Ahmadi, IT Manager at Ghor Institute of Higher Education in Afghanistan who attended the workshop for AfgREN Network Engineers in Kabul in July 2017.

The selected 2nd CFPs projects are equally diverse – even if at an early stage - with further 8 capacity building workshops to support the Asi@Connect beneficiary countries, programmes for cloud and federated identity platform deployment as well as community building projects in areas such as disaster mitigation, nuclear medicine and development of distance learning platforms.

Asian partners in the driving seat

All proposals are contracted with and supported by TEIN*CC, the Korea-based organisation that manages the Asi@Connect project up to 2021. The Asi@Connect Steering Committee (SC) plays a vital role in ensuring that this complex process runs smoothly and is transparent.

"It is fair to say, when the first CFPs closed in January 2017, the SC members were confronted with an amazing, but equally overwhelming result, with a steep learning curve ahead. However, they rolled up their sleeves, set up review committees and eventually went on to recommend 12 solid proposals to the Asi@ Connect Governors".

Jie An, Chair of Asi@Connect Steering Committee; CERNET, China

Most selected projects are managed by Asian partners from both developed and developing countries. From the European side, GÉANT is running a series of TRANSIT, CSIRT and federated identity workshops, while NORDUNET is supporting the Bangladeshi NREN (BdREN) improve distance learning capabilities.

CFPs have established themselves as an effective delivery mechanism of Asi@Connect. Further calls are expected over the remaining project duration – so watch this space!

To find out more about Asi@ Connect and CFPs visit **www.tein.asia**

3RD CENTRAL ASIAN NETWORKING CONFERENCE TAKES TO THE STAGE IN DUSHANBE

Follwing two previous successful editions, CRNC – the CAREN Regional Networking Conference - has established itself as the annual gathering of the R&E community across Central Asia and neighbouring regions.

CAREN
Central Asian Research and Education Network
EYR

CRNC2018

The EU-funded Central Asian regional CAREN network is a cornerstone of the Eurasian knowledge belt that stretches from Eastern Asia to Western Europe. Themed **"CAREN: strengthening the Eurasian knowledge belt"** this year's edition, CRNC2018, aims to serve as a platform for exchange and collaboration for key stakeholders across this very belt. CRNC2018 will be hosted by TARENA, the Tajik Research and Education Network Association, jointly with the Tajik Academy of Sciences, 23-24 October in the Tajik capital Dushanbe.

Over two days participants will hear about recent developments in advanced ICT services for research and higher education, stories from the field in the use of these advanced services and best practice in introducing ICT and network services at member institutions of the Central Asian NRENs.

EYR@CAREN

CRNC2018 will also feature the award ceremony for the Central Asian edition of the internationally renowned Enlighten Your Research (EYR) science support programme to facilitate scientific collaborations where data needs require international network resources to accelerate research.

Find out more about CRNC2018 at **https://crnc2018.icaren.org/en/**

WACREN 2018

From launching the new WACREN network to a play performing the relevance of NRENs

WACREN

The fourth annual WACREN conference held in Togo's capital city Lomé this year engaged its audience through lively debate and conversations. Attracting over 200 participants from 27 countries, the two-day conference (held in English and French) provided an ideal platform for NRENs and stakeholder organisations to share more knowledge on their current projects, challenges, and elaborate on potentials. This was perfectly in line with the WACREN 2018 theme which revolved all around "Unleashing Potentials".

Hosted by TogoRER, the event was formally opened with welcome remarks by Dr. Eyouléki Venant Palanga, TogoRER's coordinator, followed by a series of presentations ranging from best practices being presented through concrete cases to opportunities WACREN offers NRENs in the West and Central African region to get connected regionally as well as globally.

A graceful choir then opened the second part of the day, inviting the attendees to gather in the assembly hall for the official WACREN network launch. A play was performed explaining the importance of NRENs in a nutshell, one of the most convincing statements on the need for NRENs we have seen in a while.

Moving towards the moment of the network launch, the Togolese Minister of Higher Education and Research Prof. Octave Nicoué Broohm gave his opening remarks while showing his enthusiasm towards the new network and the conference so far.

WACREN 2018 was preceded by a 3-day BGP and Peering workshop attended by 30 participants from 7 countries - Benin, Burkina Faso, Côte d'Ivoire, Ghana, Niger, Nigeria and Togo. In addition, co-located meetings of projects such as AfricaConnect2 and NEAAR took place during the conference week.

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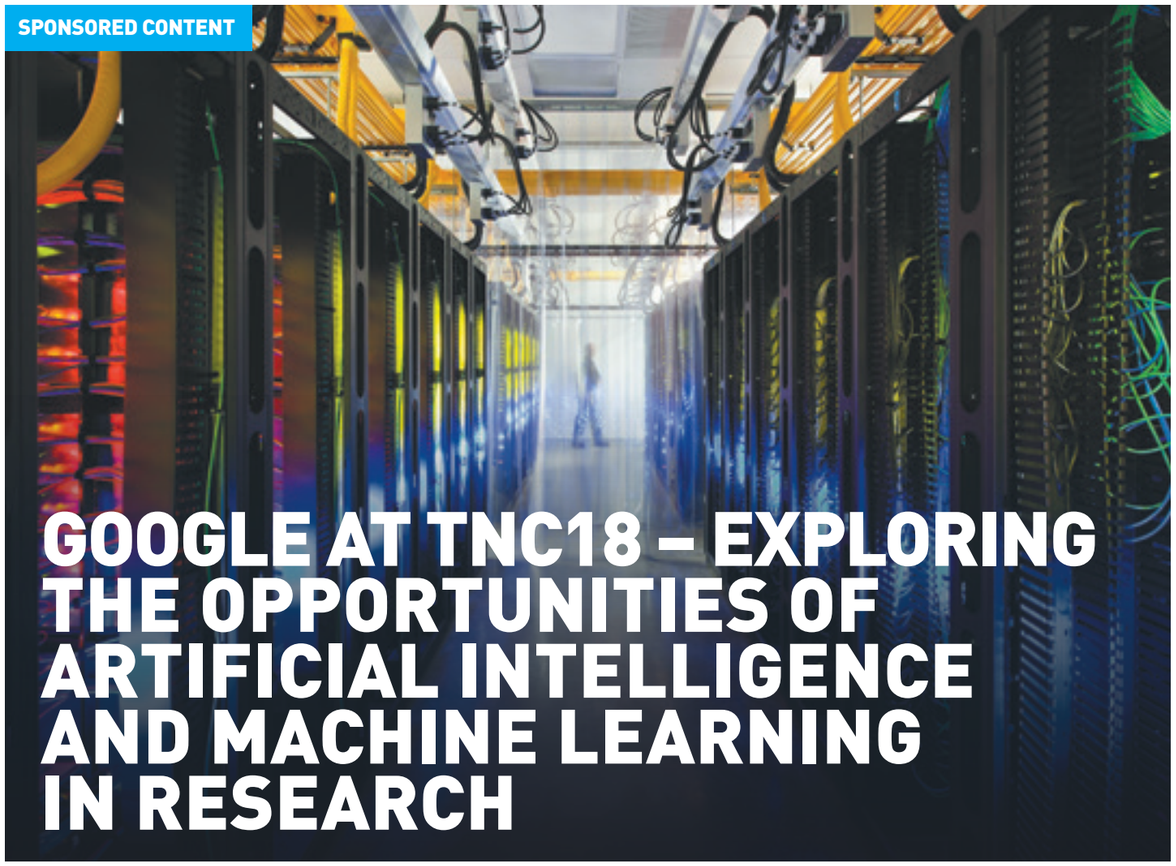

GOOGLE AT TNC18 – EXPLORING THE OPPORTUNITIES OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN RESEARCH

Google is proud to collaborate with GÉANT and the NREN communities at the TNC flagship conference this year in Trondheim. Google Cloud is committed to research and higher education across Europe and we believe in growing partnerships and building opportunities with universities and research organisations across the region. We are passionate about working with this community to push the boundaries of what is possible and transform the future of education.

Google

Machine Learning – the future of research and education

Big data and machine learning have been in Google's founding DNA since the very early days, today powering services from Google Translate to Google Photos. With research generating an unprecedented amount of data, ML tools can reveal previously untapped insights from highly unstructured, raw data efficiently and at scale. From image and language analysis to managing huge datasets and extracting insights, Google's AI and ML solutions are revolutionising the manipulation of data and information across the whole spectrum of education.

This year at TNC18 in Trondheim, Google will host a workshop highlighting the power that ML can bring to research and education. Join this session to get hands on experience with Google Cloud Platform and learn how powerful tools such as Compute Engine virtual machines, BigQuery and TensorFlow can enable you to move from bold ideas to breakthrough discoveries in a fraction of the time. We will also look at Google Cloud Machine Learning Engine, a managed service that includes pre-trained models and a platform for generating your own tailored models using the most advanced ML-optimized hardware. Cloud Machine Learning Engine makes it easy for teams to build sophisticated, large scale machine learning models in a short amount of time. Projects can easily build predictive analytics models using their own training data. For example, a financial services app that predicts values using regression models, or a classification service for images.

If you can't attend the workshop, please visit Google at booth 1 to find out how Google Cloud Platform's suite of big data and ML solutions can help power your research.

cloud.google.com

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COLLABORATING FOR IMPACT

NREN collaboration: a given from the outset, developing over time, and adapting to the challenges of technology and globalisation

NORDUnet
Nordic Gateway for Research & Education

A showcase

The Nordic countries share a long history and tradition for collaborating and are financially and culturally comparable.

Hence, competence building and knowledge sharing come easy via a great number of established Nordic NREN fora such as Media Services, security, network planning, trust and identity, communications, and technical strategy. Video conferences and face-to-face meetings form the spikes for the topics and questions that have been raised and discussed via e-mail safeguarding that these teams work towards the same goals for best possible impact.

In the front line

Looking back on Nordic collaboration in the 80's, one of the pioneers, Lars Backström of the University of Helsinki, puts it like this:

"The collaboration gave us an opportunity to maintain contacts with those actors on the world stage who were developing networking. So, we were in the front line all the time. Alone we would have been left on the sidelines. When we gathered our resources, we could send at least one person to all the important meetings and working groups. And because of this collaboration, the knowledge gained spread widely - that could not have happened if that person had only had contacts with his own organisation. I don't think we can measure the worth of all this in terms of money."

Sharing resources

That same strength is behind many present Nordic NREN collaborations, such as extending the reach of the networks beyond the Nordics.

Ten years ago, the European R&E networks operated beyond national borders only in a very limited sense. The Nordic networks were among the first to do it, establishing cross border fibres. On top of that they started sharing network resources by operating Alien Wavelengths. And by establishing a Nordic presence at important internet exchange points like Amsterdam, London and Frankfurt it was possible to develop an efficient peering strategy. Exchanging traffic directly with major internet operators and content providers such as Facebook, Amazon and Akamai they are now both offering the best possible service connectivity to both R&E network, cloud services, and commercial services for users in science and education and getting the strongest connectivity at the best price.

The step-by-step approach

According to Ingrid Melve, former director of the eCampus programme with Norwegian Uninett, Nordic NREN collaboration has developed step-by-step.

"Our starting point was working together to create a strong, flexible infrastructure across the Nordics", she explains. "From there we went on to identity management. The Nordics were first to demonstrate an identity service working not only in one country, but across borders also. Having this foundation in place meant we were able to move on to collaborate on a range of services. The first one was Adobe Connect, a collaboration platform for online events, such as meetings, web conferences, eLearning and webinars. Setting up Adobe Connect we could use the same background mechanisms across Scandinavia, and at the same time allow for local adjustments. That made it much easier - and cheaper as well."

Joint procurement

Likewise, the financial side of things, according to Ingrid, is one of the two main advantages of NRENs collaborating across borders, enabling joint procurement to the benefit of all participants.

"Obviously, money is important. Vendors will find you much more interesting, if you represent five countries instead of one, so the dialogue becomes easier. The other main advantage is competence building."

Merging infrastructures

Looking into the future, Martin Bech, CTO of Danish e-infrastructure Cooperation DeiC, envisions a new great challenge to be tackled by the Nordic NREN community, to stay in the front line of transnational NREN collaboration:

"We should build a common, transnational infrastructure utilizing as many parts of our separate national infrastructures as possible. Nobody has done that before and I think if would be a great project for us. Right now we operate a number of parallel infrastructures.

Words
Gitte Julin Kudsk and Susanne Michelsen

As an example, there are two cables east-west across Denmark. One run by DeiC and one run by NORDUnet. We should merge these two connections into one. We need to build a new generation of joint networks, using a bottom-up approach and building this transnational infrastructure with as many national bits and pieces as possible. In that way the Nordics can show the way for the rest of Europe."

Knowledge sharing

The bigger platform for knowledge sharing is of course the NORDUnet conference. An event that every two years bring the Nordic R&E community and NREN peers from Europe and beyond together in a Nordic setting to listen, learn and share news and views. For the tech-savy community the NORDUnet Technical Workshop (NTW) offers space and room for all the specific topics and activities that are on top of people's agendas that particular year.

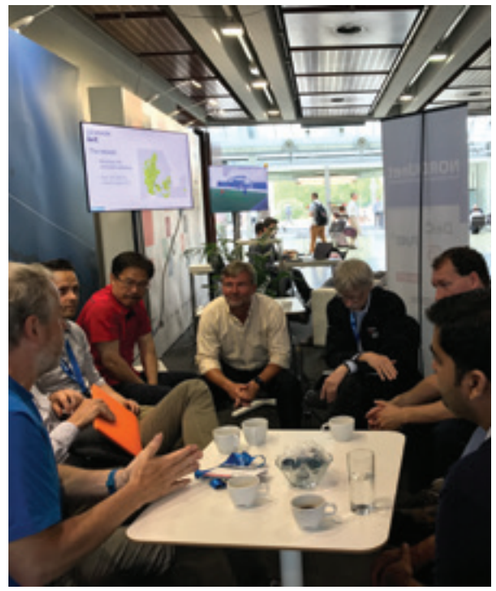
September 2018 sees the 30th NORDUnet Conference co-hosted with Danish NREN DeiC on 20th – 22nd September in Helsingør (Elsinore).

The Power of Regional Collaboration

By creating NORDUnet, the Nordic NREN have established a strong forum for regional collaboration. By being regional, the collaboration among a small group of similar countries is able to achieve a level of sharing, using resources, and have impact that is difficult in a continental partnership. At the same time, it offers an excellent platform for participating in European and Global collaborations.

We believe that joining forces and reaching out to help connecting researchers and educators on a regional basis would greatly strengthen R&E network collaboration, also outside the Nordic countries.

www.nordu.net



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ECI THE ELASTIC NETWORK

OPEN OPTICAL SYSTEMS: JUST BECAUSE YOU CAN DOES IT MEAN YOU SHOULD?

Network operators are captivated by the concept of open or disaggregated optical systems, whereby they can assemble an optical network by piecing together parts from various vendors. They are encouraged by initiatives like disaggregated transponder boxes for DCI applications, an Open ROADM MSA, and the Telecom Infra Project Voyager white box. This gives rise to the question we raise in the title, "Just because you can does it mean you should?"

A great place to start this discussion is with operator motivations. A recent IHS survey ranked the top three motivators for open optical systems as, (1) lower CAPEX through better negotiating power, (2) less reliance on a single vendor, and (3) lower OPEX based on faster installation and maintenance. There is no arguing with these desires for lower cost and greater choice. So let's see how open optical can deliver on them in building a flexible optical backbone for a typical multisite Research and Education Network (REN). We'll look at three levels of disaggregation.

Open Networks:

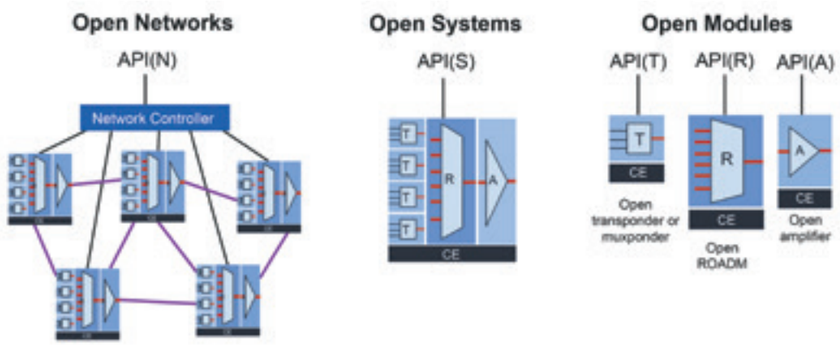
At the lowest level (least amount) of disaggregation – an open network – a single vendor supplies the entire optical backbone. This is the predominant situation today. While not multivendor, we can assume the network is fairly priced based on a competitive bid situation. And as a turnkey installation, the REN doesn't need to invest in system integration. If needed, the optical backbone is open at a network level for services orchestration through a network control API.

Open Systems:

At a medium level of disaggregation – open systems – several vendors supply integrated nodes of network equipment (NEs). Due to the more competitive nature of the situation, initial pricing will likely be lower than in a single vendor network. However, in the face of smaller economies of scale, this may be offset by higher downstream support costs, resulting in a similar long term cost of ownership to the REN. At an NE level of disaggregation, the REN must also start investing in system integration, and developing management and control systems using EMS or NE-level APIs. This can deliver customized and streamlined operations, although these benefits must be weighed against added development costs.

Another point of caution in this approach is that optical systems are fundamentally analog and usually incorporate proprietary transmission engineering. In order for transponders from different vendors to pass traffic, they typically must be set to a lowest common denominator for performance, such as using the simplest forward error correction (FEC) schemes. This prevents obtaining the performance available in a single vendor approach.

Likewise, building networks with elements from multiple vendors diminishes the possibility of using any advanced network monitoring, communications, or operations capabilities that have been developed by the vendors. In-band signaling for amplifier adjustments, performance insights into component health, and automated responses to specific inputs, can provide significant benefits in larger REN networks that will be harder to obtain in a multi-NE network.



Words
Jonathan Homa, Scott Wilkinson, ECI Telecom

Open Modules:

At the highest level of disaggregation – open modules – multiple vendors supply stand-alone subsystems like transponders, ROADMs, and amplifiers. It is difficult to say whether assembling pieces individually is intrinsically less expensive than purchasing integrated NEs, particularly since each subsystem now needs to bear the overhead of physical packaging and common equipment like power supplies and fans.

For this maximum level of disaggregation, RENs must invest significantly in system integration and homegrown management and control systems. These must aggregate hundreds if not thousands of open sub-system APIs, and is probably beyond the scope of most RENs in terms of resource availability and expertise. This software complexity increases even more for white boxes, where APIs now become firmware system calls. Completely disaggregated networks are primarily being investigated at this time by large cloud companies with significant software resources to tap and relatively simple point-to-point networks to operate, neither of which are the case for RENs.

That said, we do see niche applications within REN networks where sub-system level disaggregation can make sense! One application is to support synchronous data replication, where a change to a database in a primary data center is not committed until it is duplicated in a secondary data center. This requires an optical link with very high bandwidth and very low latency, but only needs to span shorter distances (up to 80km) with no requirements for ROADMs or mid-span amplifiers. This "patch cord extension" is ideally suited for disaggregated transponder boxes.

Another application is to implement an optical switching hub for links coming and going from many nodes. Such a hub might be set up as part of a network testing and research laboratory to enable changing network conditions via software. Without a need to integrate with transponders this may be well suited for disaggregated ROADMs.

Summing Up:

So if we take a step back and weigh the pros and cons, we start to see a picture emerge of where open optical systems are likely headed in RENs in the coming years.

1. The bulk of a REN optical backbone network will continue to be provided by a single vendor. This will be accompanied by an increased emphasis on open and powerful network control APIs for integration with service orchestration applications.
2. Geographically bound or functional subsets of the optical backbone will start being awarded to secondary vendors. This approach ensures competitive pricing, and provides benefits of more customized control over the network. This step will be undertaken by RENs that possess sufficient skillsets and resources to perform the necessary system and operations integration.
3. Islands of disaggregated subsystems may be deployed for niche applications that deliver significant cost, performance, or control benefits, with relatively low system integration obstacles. Examples are for point-to-point data center interconnection or ROADM hubs.

To continue this discussion on open optical systems in person, and to learn about ECI's notable track record of building high performance optical backbones for RENs, we welcome you to visit ECI at booth #14 at TNC18 in Trondheim.

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EMPOWERING RESEARCHERS TO ACHIEVE MORE WITH MICROSOFT AZURE

Researchers dream of limitless compute and data capabilities that they can easily scale up and down, gives them full control, and allows them to install whatever they want, whenever they need it.

Delivering this nirvana environment to researchers is challenging for IT or research organisations. It is hard to predict what type of compute, or how much data, a researcher is going to need. Procurement timescales can be long. Managing fixed or limited resources, where demand outstrips supply, is hard. Securing research systems, keeping them compliant, and up-to-date, is not always appreciated by end-users who may prefer quick and dirty solutions.

Microsoft Azure is the ideal platform to deliver on both the needs of researchers, and IT departments, acting as a critical bridge between the agile and significant demands of researchers, and secure, managed, flexible service provision by central IT and large research organisations. The scale and pace of innovation in Microsoft Azure ensures that researchers have access to the latest technology at the scale they need. Open source is a part of Microsoft's day-to-day approach to cloud innovation. Microsoft has more security and privacy certifications than any other cloud provider, across 50 regions, with up to 1.6 Pbps of network bandwidth in a region.

For example, Randall Sobie, High-Energy Physics Computing Group Leader at the University of Victoria (Canada), created a flexible cloud system for university researchers working on the ATLAS project, a collaboration of 3,000 international physicists.

"Azure basically gives us a solid, rock solid performance - no questions asked."

Says, Rolf Seuster, HEPnet Technical Manager, University of Victoria, Canada.

From Azure for Research video at - **https://customers.microsoft.com/en-us/story/university-victoria-azure-cloud-services-canada-education.**

Transforming research

Researchers' demands can be difficult to cater for in even the largest universities and research organisations. Researchers often need to go **beyond the desktop** and access a workstation with more cores or memory. Azure makes this easy, providing the latest Intel and AMD processors, optimised for compute performance, and largest virtual machines in the public cloud - Azure's M-Series VMs offer up to 128 vCPUs and 3.8TiB of RAM.

Computing at scale on hundreds or thousands of processors, is usually catered for on high-performance facilities at university, regional, and national levels. Microsoft Azure is the only hyper-scale public cloud with true high-performance computing performance with near-linear scalability on thousands of cores. You can tune the machine capabilities to each job, and use low-priority VMs to reduce costs by up to 80%. Azure complements existing HPC by providing extra capability to offload pleasingly parallel compute jobs. The WorldPop project uses a combination of on-premise HPC and Microsoft Azure to optimise their research. "Azure was the only cloud that gave us true supercomputing performance. At WorldPop, we're shaving as much as 90 percent off our calculation run-times using Microsoft Azure," says Andy Tatem, a professor of geography and environment at the University of Southampton (UK) and the director of the WorldPop initiative.

The Data Science, Big Data and Artificial intelligence waves are upon us, but it is increasingly difficult to keep up with the changing demands of researchers. The effort required to deploy, validate, and support an ever-changing data science stack is significant. Microsoft Azure offers the latest open-source tools and technologies as easy-to-deploy services, such as Apache Spark, DataBricks, Azure Data Lake, Azure Databases for MySQL and Postgres, and deep learning frameworks such as TensorFlow, Caffe and CNTK. NVIDIA and Microsoft collaborate closely to ensure that the latest GPU hardware is available through Microsoft Azure, including Tesla P100 and V100 GPUs, uniquely with InfiniBand low-latency interconnects for GPU-enabled HPC computations.

Internet of Things research is accelerating via the nexus of cheap and capable devices, connectivity, and cloud computing. Azure IoT Hub makes it easy to connect, monitor and manage IoT assets securely and seamlessly. For example, Professor Yogesh Simmhan at Indian Institute of Science Bangalore is deploying an Azure IoT-based network of sensors in the IISc campus to efficiently monitor the flow of water from source to consumption, as part of the Indian national Smart Cities initiative. IoT Edge extends AI and advanced analytics to edge devices, including support for offline and intermittent connectivity. Azure Sphere is a new solution for creating highly secured, Internet-connected microcontroller (MCU) devices, opening up more possibilities for IoT research globally.

Research is a collaborative endeavour, but it's not always easy to share data, workflows and software with other researchers. Cloud computing makes this easier, by co-locating data, workbooks, and compute. Azure Web Apps for Linux and Windows allow you to deploy scalable, secure, research web sites using open-source platforms such as Wordpress and Drupal – and even more flexibility through Azure Web Apps for Containers. Azure Notebooks provides executable Jupyter Notebooks-as-a-Service for free. Azure is the ideal platform for creating services that make research data and outputs easily available around the world.

Words
Dr Kenji Takeda, Director, Azure for Research, Microsoft

Better together

Cloud computing simultaneously empowers both researchers and IT professionals to achieve more together. Tremendous agility, flexibility, and scalability for researchers can be realised, while simultaneously ensuring security, compliance, and maximising resources utilisation, for IT departments to deliver maximum value for the university.

Thousands of universities, schools and research institutions can now benefit from Microsoft Azure cloud services with procurement, contracting and integration taken care of by GÉANT and the NREN community under a common GÉANT IaaS framework agreement. Institutions can buy and use Microsoft Azure directly, without the need for complex contract procedures, and benefit from volume discounts, while the framework contracts themselves are compliant with EU privacy and data security regulations. Find out more at **https://aka.ms/geant**

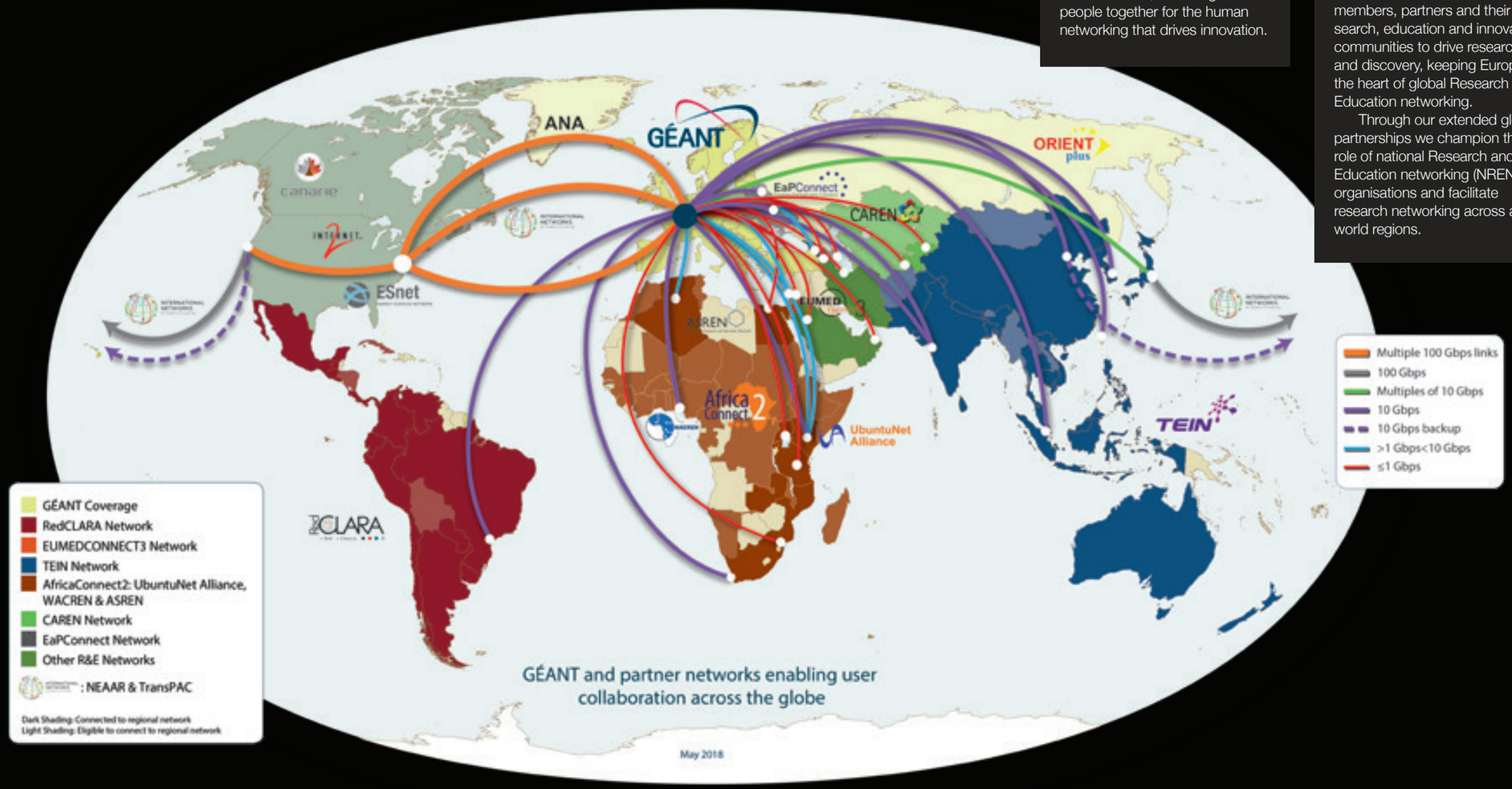
Come and visit us at stand 10 at the TNC conference to find out more about how we can support you to accelerate discovery by providing you with almost every piece of computing and data capability that you may require for your research.

KEEP UP TO DATE WITH GÉANT

GÉANT AT A GLANCE

GÉANT is the leading collaboration on network and related infrastructure and services for the benefit of Research and Education, contributing to Europe's economic growth and competitiveness.

GÉANT has 41 member countries and is owned by its core NREN membership, and also has Associate members including commercial organisations and multi-national research infrastructures and projects.



Networks

GÉANT interconnects research, education and innovation communities worldwide, with secure, high-capacity networks. We plan, procure and build the large-scale, high-speed networks that are essential for sharing, accessing and processing the high data volumes generated by Research and Education communities, and for testing innovative technologies and applications.

GÉANT also provides network and collaboration services that facilitate international cooperation between researchers and educators, and brings people together for the human networking that drives innovation.

Services

GÉANT develops the services its members need to support researchers, educators and innovators - at national, European and international levels.

Our portfolio of advanced services covers connectivity and network management, trust identity and security, real-time communications, storage and clouds and professional services.

People

GÉANT collaborates with its members, partners and their re search, education and innovation communities to drive research and discovery, keeping Europe at the heart of global Research and Education networking.

Through our extended global partnerships we champion the role of national Research and Education networking (NREN) organisations and facilitate research networking across all world regions.

Innovation

GÉANT invests in the research and development of network architectures, technologies and paradigms to develop into the services, processes, tools and network capabilities of tomorrow.

GÉANT facilitates community collaboration that pushes the boundaries of networking possibilities. Fresh ideas from task forces, special interest groups and open calls are applied through specific research activities and initiatives, informed by foresight studies and future user needs to achieve and promote innovation.

Projects

GÉANT is a trusted European Commission (EC) partner in many global collaboration projects and initiatives through our special relationship with the European Union.

We have built up our depth of network expertise and leadership over two decades, and excel in managing and participating in highly successful projects, delivering Research and Education networks and services, and coordinating innovation.

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This magazine is produced as part of the GÉANT Specific Grant Agreement GN4-2 (No. 731122), that has received funding from the European Union's 2020 research and innovation programme under the GÉANT2020 Framework Partnership Agreement (No. 653998). The content of this document is the sole responsibility of GÉANT and can under no circumstances be regarded as reflecting the position of the European Union.

CONNECT/0618