



# Celtic-Plus

## Newsletter 1/2016

HFCC/G.fast – Hybrid Fibre-Copper Connectivity  
using G.fast

Business impact and networking – Celtic-Plus Event  
in Stockholm

SASER – Safe and Secure European Routing



# Editorial

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## Dear readers,

Some people ask critical questions about what the value of collaborative international R&D project work really is. Are programmes like EUREKA, Celtic-Plus and other collaborative initiatives truly worth the tremendous effort we put into them? The answer from a Celtic-Plus perspective is a clear ‘yes’. In November 2015, we received additional proof for that when we had the final reviews and the closing session of our large Flagship Project, SASER – Safe and Secure European Routing. At this session, which was hosted by the project leader Alcatel-Lucent in Stuttgart, the SASER project participants proudly presented their ground-breaking achievements. More than 80 participants attended the event, among them high-level representatives of the funding bodies in Germany, France and Finland.

The European business impact that SASER already achieved during the lifetime of the project is huge. Dozens of new products and product improvements, many standards contributions, and numerous published papers are proof that SASER has been a huge step towards better and more secure communications in Europe and a push for European industry in related ICT sectors. This demonstrates very well that such collaborative R&D projects are crucial for Europe’s companies, because they ensure that technology invented and made in Europe stays at the competitive edge necessary to be successful in the global market of cutting-edge technical products.

A new Celtic-Plus Flagship Project has started in April 2016. The project is called SENDATE, Secure Networking for a Data Center Cloud in Europe, which is applying innovative approaches such as Network Functions Virtualization (NFV) in combination with Software Defined Networking (SDN) for a secure, flexible, low latency, and locality-aware distributed data centre approach to support the upcoming application scenarios.

Due to the high number of labelled projects in 2015, we still have about 10 new projects in the starting phase. The next chance to submit project proposals to Celtic-Plus is our Autumn Call, closing on 14 October 2016.

To better help you find your way into the Celtic-Plus world, we have changed and updated the information that was previously presented in the Celtic-Plus Purple Book in a completely new document: “Celtic-Plus – Scope and Research Areas 2016/2017”. I hope that this document will make it easier for you to work on your Celtic-Plus project idea and get familiar with the Celtic-Plus programme philosophy.

In this issue of our newsletter, we present to you project results and information on our activities. In spring 2016, we had a Proposers Day in Madrid and our Celtic-Plus Event in Stockholm, which was collocated with the EUREKA Innovation Week and other EUREKA Cluster meetings that were hosted under the Swedish EUREKA Chairmanship. At Celtic-Plus we are very proud that another Celtic-Plus project won the prestigious EUREKA Innovation Award. Our project HFCC/G.fast (Hybrid Fibre-Copper connectivity using G.fast) has been selected as winner in the category ‘Competitiveness’. Please read their success story in this issue.

You might have noticed that I took over the responsibility for the newsletter from Peter Stollenmayer who returned to his parent company, Deutsche Telekom. I would like to thank him for the excellent work that he contributed during the last two years in the Celtic Office.

I hope you enjoy reading this issue of the Celtic-Plus Newsletter, and would welcome your comments.

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Editor-in-chief

## IMPRINT

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# HFCC/G.fast – Hybrid Fibre-Copper Connectivity using G.fast



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**The Celtic-Plus project HFCC/G.fast, which stands for Hybrid Fibre-Copper connectivity using G.fast, had the goal of completing the standardization of G.fast, and it achieved its goal. This article tells you how, and why this is important.**

The development of European economy, lifestyle and society is increasingly dependent on ICT. We are experiencing an ICT-driven industrial revolution where new values are created at unprecedented rates. One cornerstone of this development of competitiveness, lifestyle, and society is broadband access systems. Without affordable and capable broadband connections to our homes, our lives would be quite different. Our goal is to bring users ten times more bandwidth at much lower cost than any alternative.

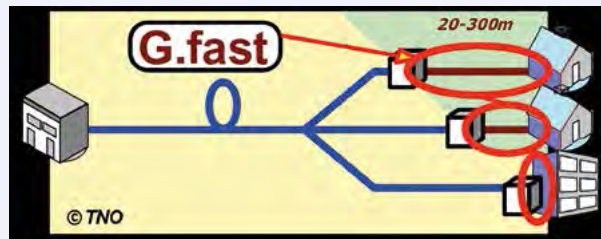


Figure 1: The deployment of G.fast in the access network

A central development is that optical fibre gradually replaces copper growing from the central offices outwards so that new generations of broadband systems can operate over shorter and shorter copper loops and deliver higher bandwidths. This progression has been achieved through first voiceband modems and ISDN, over the ADSL family and then the VDSL systems, delivering about a factor of ten more bandwidth every ten years or so. The next step is G.fast, a hybrid fibre-copper system that delivers gigabit speeds over telephony wires.

With the first project in a series of three, the CELTIC project 4GBB, we developed the G.fast concept and initiated standardization of G.fast family of standards. The first version of the standard was completed in record time by the CELTIC project HFCC/G.fast. Previous broadband generations took about ten years from concept to market, but through effective collaboration and coordination using the CELTIC projects as a platform, it was possible to cut five years of the process. The project's vertical structure, where each segment of the chain was represented by at least one enthusiastic partner, together with the project's strong industrial orientation, were key elements of success.

### The G.fast technology

G.fast surely is the ideal technology for pumping up the capacity of the access network yet a factor of ten. Fibre roll-out all the way to the homes is still prohibitively expensive and therefore not hap-

pening on a sufficient scale. G.fast needs new fibre but bridges the final, most expensive, gap of about 200 m to the homes by providing high-speed broadband over the existing copper cables (see Figure 1).

### G.fast standardisation – main goal of HFCC/G.fast

The main goal of the HFCC/G.fast project was to complete the G.fast standardisation which was reached on 4th December 2014. Members of the consortium submitted over 300 standardization contributions during the brief period of five years from the start of G.fast standardisation until deployment (see Figure 2).

### Conclusion

Most people in the industrialized world can relate to broadband communications. We all use the Internet and all the content and services made available by this incredible platform. It has not only changed our lives and lifestyle, it is also profoundly transforming business and industry. The DSL family, operating over telephony copper cables and backhauled by optical fibre, has been the most common broadband access type throughout this societal metamorphosis. As such, it has had a tremendous impact on our society, our economy and us. With 4GBB, we initiated the standardization of G.fast, the newest member of this family of broadband systems. With HFCC, we completed the standard and produced G.fast hardware and support systems.

Further information about the HFCC/G.fast project is available at [www.celticplus.eu/project-hfcc\\_g\\_fast/](http://www.celticplus.eu/project-hfcc_g_fast/)



Figure 2: Standardisation contributions from 4GBB and HFCC/G.fast partners (note on the right side that interoperability testing for ADSL came after large-scale deployment)



# Ideas for New Projects

## Celtic-Plus Proposers Day in Madrid



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**On 16 March 2016, Celtic-Plus held a Proposers Day in Madrid, kindly hosted by CDTI, one of the two Spanish funding authorities. Celtic-Plus Proposers Days follow mainly three purposes: informing about public funding opportunities, discussing potential ideas for Celtic-Plus project proposals, and networking with potential project partners. Spain is in charge of the EUREKA Chairmanship in 2016/2017, and we expect a strong increase of attention regarding EUREKA- and EUREKA-Cluster projects.**

The Celtic Office organises three Proposers Days per year in different EUREKA countries. In 2016, Proposers Days are organized in Madrid, Istanbul, and Belgium.

For this first Proposers Day of the year in Madrid, nearly 90 people had registered. The host, CDTI (Centro para el Desarrollo Tecnológico Industrial), provided a perfect local organisation for open and constructive discussions. The audience was welcomed by José María Pérez, head of energy communications at CDTI, Antonio Alcolea, Deputy General Director of SETSI, MINETUR (Ministry of Industry, Energy and Tourism), and by the Celtic-Plus Chairman, Jacques Magen, who invited all Spanish ICT-related companies to actively participate in Celtic-Plus.

Oscar Chabrera, who has led the award-winning HIPERMED (High Performance Telemedicine platform) project, reported in his keynote about the large societal and commercial impacts of his successful Celtic-Plus project. He stressed that working within the Celtic-Plus environment provides the freedom for projects aiming at exploitable results to add real value.



## 16 March 2016

Celtic-Plus Proposers Day  
at CDTI  
Madrid, Spain

### Spanish Celtic-Plus framework and public funding

Oscar Fernández Moyana and Javier Echávarri from CDTI, together with Jesus Cañadas and José Ángel Alonso from MINETUR, informed the audience about the Spanish Celtic-Plus framework and the improvements in public funding of MINETUR. The public funding mechanisms of CDTI and MINETUR are different. CDTI's funding is based on loans, of which 30% are not to be re-imbursed; they can go up to 75% of the eligible budget. In addition CDTI issues tax relief certificates. Organisations can apply for the funds at any time. MINETUR's funding is based on grants and loans; grants can go up to 60% for SMEs. There is one call per year; the 2016 deadline is planned for the end of July. The Celtic-Plus Label is a pre-requisite for being funded.

José Tomás Romero introduced "es.Internet", an industry-led technology platform with about 400 members. One of the premises is "market-pull", i.e. the different application sectors raise the needs. Although it is a Spanish initiative, it has an international scope and collaborates with FI-PPP, 5G-PPP, and EUREKA Clusters like Celtic-Plus.

### Celtic-Plus project idea pitches

One of the core elements of the Proposers Day was the presentation of nine interesting project idea pitches, which were well received and thoroughly discussed.

Among the presented research ideas are 5G-related networks, applications, and testbeds, and RFID technologies. For the detailed presentations see <https://www.celticplus.eu/event/celtic-plus-proposers-day-on-16-march-2016-in-madrid/>

### Participating in Celtic-Plus is easy

In a best-practices session the participants learned how easy it is to submit a project proposal to Celtic-Plus. By the different Call deadlines proposals get submitted to the Celtic-Plus online proposal portal. A template for the proposal is available on the Celtic-Plus Website at [www.celticplus.eu](http://www.celticplus.eu). Usually within a month, the proposals are evaluated by independent experts and labelled in a special Celtic-Plus Labelling meeting with the Public Funding Authorities. Typically within less than six weeks, proposers get a reply whether their projects received the Celtic-Plus Label, and what comments were made by the experts and Funding Authorities. As soon as the public funding is ensured, labelled projects can start. The typical success rate is 60-70%. The Celtic Office is happy to provide any required support through all phases.

### Conclusion

The Celtic-Plus Proposers Days are crucial means for incubating novel ideas for new Celtic-Plus projects, to discuss these ideas with interested experts and to network with other organisations to build strong consortia for successful projects. If the ideas are turning into project proposals, consortia with at least two EUREKA countries participating are very welcome to submit their proposals at the upcoming Call on 14 October 2016.

### Further information

- Presentation slides and photos of the Proposers Day - [www.celticplus.eu/event/celtic-plus-proposers-day-on-16-march-2016-in-madrid/](http://www.celticplus.eu/event/celtic-plus-proposers-day-on-16-march-2016-in-madrid/)
- Summaries and contacts of project ideas presented at earlier Proposers Days - [www.celticplus.eu/project-ideas-from-proposers-days](http://www.celticplus.eu/project-ideas-from-proposers-days)
- Information on upcoming Proposers Days - [www.celticplus.eu/?post\\_type=tribe\\_events](http://www.celticplus.eu/?post_type=tribe_events)

# Business impact and networking

## Celtic-Plus Event in Stockholm



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**This year's Celtic-Plus Event took place under the Swedish EUREKA chairmanship in Stockholm, Sweden, on 28 – 29 April 2016. It was held in conjunction with the EUREKA Innovation Week, which attracted more than 900 participants and 50 exhibitors from 33 countries.**

The Celtic-Plus Event was opened by Cecilia Sjöberg, Director and Head of Services and ICT Division at VINNOVA, and Celtic-Plus Chairman Jacques Magen. The event presented achievements of Celtic-Plus projects and provided a glimpse on the future of information and communications technologies. The major annual event of EUREKA Cluster Celtic-Plus also offered ample matchmaking opportunities for developing new project ideas and partnerships in the area of ICT.

The participants had the opportunity to get first-hand insights on a number of successful Celtic-Plus projects, including some which had finished a few years ago and which have already achieved significant business impact.

### Rollout of G.fast technology in the UK

A special highlight of the event was the announcement that BT is now rolling out the new gigabit broadband access technology in the UK to 10 million customers. The G.fast technology that was developed by the HFCC/G.fast project is the next step for bringing optical fibre closer to homes. In many aspects it is the successor of the well-known DSL technology but with Gbps class bandwidth. For this outstanding achievement the HFCC/G.fast project has won the prestigious EUREKA award in the category "Competitiveness".

In a roundtable the representatives from six outstanding projects discussed together about their achievements and the usefulness of the EUREKA/Celtic-Plus context. In addition, five Celtic-Plus projects received a Celtic-Plus Award (see next article).



### Common session of Celtic-Plus and ITEA 3

For the first time Celtic-Plus and ITEA 3 had a joint session. It was animated by the two chair persons, Zeynep Sarilar from ITEA 3 and Jacques Magen from Celtic-Plus. The keynote presentation by Lena Carlsson from the Swedish Agency for Economic and Regional Growth gave new insights on how digitalisation transforms society. The second keynote speaker, Daniele Quercia from Bell Labs in Cambridge, presented completely new aspects for future city planning, taking into account noises and also odours, for example in "Smelly Maps" of the city of London.

### 15 Celtic-Plus projects in the exhibition

The exhibition included 15 Celtic-Plus projects that presented their results, which attracted many participants who engaged in intensive discussions and networking. The project booths showed real prototypes that were either hardware or software implementations.

### Sessions on the second day

The second day started with a keynote speech by Anna Piperal from eEstonia. She presented news from one of the most digitalized countries in the world, Estonia, where 97% of all administrative





Anna Piperal from eEstonia presented the advanced state of digitization in her country

acts are done electronically, without paper. This was intensively discussed by the audience.

In a roundtable session, public authorities from Finland, France, Spain, Sweden, Turkey and for the first time also from Canada and from South-Korea explained the processes and recent development in their countries that allow to fund Celtic-Plus projects.



Roundtable session of public authorities, from left: Jacques Magen (Moderator), Hannu Nurmi (Finland), Mark Burbidge (Canada), Juana Sanchez (Spain, CDTI), Mete Karaca (Turkey), Andreas Aurelius (Sweden), Jesus Canadas (Spain, MINETUR), Serge Bodjrenou (France), and Gitae Shim (South-Korea)

The next session was dedicated to 25 new project ideas that were presented in five-minute pitches to the audience. This session was the starting point for ample networking among emerging project consortia and talks between future proposer and the representatives from public authorities. In the project pitch session not only project ideas from Europe, but for the first time also ideas from Canada and South Korea

were presented. A large number of transnational research projects are expected to be launched as a result of the many personal encounters at the event.

- Further information on the Celtic-Plus Event 2016 is available at <https://www.celticplus.eu/event/celtic-plus-event-2016/>

## Five Winners at Celtic-Plus Awards 2016 in Stockholm



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**At the Celtic-Plus Event in Stockholm on 28 April 2016, five projects were awarded for their outstanding work. Three projects received the Celtic-Plus Excellence Award and two projects the Celtic-Plus Innovation Award. The awards were presented to the winners by Celtic-Plus chairman Jacques Magen and Andreas Aurelius, head of ICT at Vinnova, the Swedish innovation agency, which hosted the Celtic-Plus Event as part of the EUREKA Innovation Week.**

### Excellence Award in the category Network Technologies: SASER – Safe and Secure European Routing

SASER has contributed to making communications networks in Europe faster, more cost-effective, safer and more secure. The goal of Celtic-Plus flagship project SASER was to provide concepts and solutions for secure transport networks in the 2020 time frame.

The quantity and quality of SASER results is truly impressive, and the business importance of SASER for Europe is extremely high. With the results of the SASER project, Europe has significantly increased its competitiveness in the areas of optical networking and network security.

- Project leader: Alcatel-Lucent Deutschland AG, Germany
- Duration: August 2012 – December 2015
- Website: <http://projects.celticplus.eu/saser/>

### Excellence Award in the category Services and Applications: QuEEN – Quality of Experience Estimators in Networks

QuEEN developed a new quality-of-experience (QoE) agent, which can flexibly aggregate QoE components. The project created a powerful quality assessment tool that adapts to various communications technologies.

The project has been the source for a new paradigm in the QoE technology. It has realized a new modular and layered QoE agent that can flexibly aggregate different QoE components. The QuEEN Agent has the potential to become “an enabler for a complete new way of using QoE in many different communication related fields.

- Project leader: Orange S.A., France
- Duration: September 2011 – December 2014
- Website: <https://www.celticplus.eu/project-queen/>

### Excellence Award in the category Smart Cities: TILAS – Technology improvements for large scale smart cities deployments

TILAS enhanced the already deployed infrastructure in Santander's Smart City with its over 1,200 sensors. It provided solutions ranging from node testing, node packaging, latency reduction to over the air programming.

The project is an important step in the Internet of Things (IoT) development for Smart Cities. It is very positive that components developed in the project have been tested on real Smart City platforms in Santander, Seoul, Paris and Grenoble.

- Project leader: TST Sistemas, Spain
- Duration: March 2013 – December 2015
- Website: <https://www.celticplus.eu/project-tilas/>

### Celtic-Plus Innovation Award: HIPERMED – High Performance Telemedicine platform

Hipermed implemented a High Performance Telemedicine Platform based on a unified Service Oriented Architecture, which provides media over IP.

Five healthcare scenarios (professional-to-professional and professional-to-patient) have been implemented on the platform and were validated by medical doctors.

Hipermed was the first true Multi-domain Celtic project where 3 hospitals have been actively involved and where the expertise from the medical side became equally important as the communication aspects.

As a result of the project, one new company, VIDEOCAFE, was founded, and 20 new jobs created.

- Project leader: Merkur Energética 2010, Spain
- Duration: July 2010 – June 2013
- Website: <http://www.hipermed.org>

### Celtic-Plus Innovation Award: IPNQSIS – IP Network monitoring for Quality of Service Intelligent Support

IPNQSIS developed mechanisms that allow monitoring and managing service quality of IPTV, Mobile TV, VoIP and videoconferencing. These mechanisms enable optimising the customers' Quality of Experience.

IPNQSIS has demonstrated a high level of innovation and business relevance. A particularly strong point is the exchange and benchmarking of components, which resulted in a common vision between four national demonstrators. Furthermore, the project addressed the links between QoS and QoE through different technical approaches and for different scenarios.

- Project leader: Indra Sistemas, Spain
- Duration: October 2010 – April 2013
- Website: <https://www.celticplus.eu/project-ipnqsis/>



# SASER – Safe and Secure European Routing



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In the SASER project a European consortium of 69 leading industry and academic partners from Germany, France, Finland, Denmark, and the United Kingdom joined

forces to develop safe and secure European routing. The goal of SASER was to provide the scientific, technical, and technological concepts and solutions for secure telecommunication networks in the 2020 time-frame. These European solutions are based on the strengths and expertise in security, software-defined networking, and high-speed optical transport networks to overcome the bottlenecks and vulnerabilities of today's electronic all-IP based infrastructure.

## Key topics

The collaborative work of the partners in SASER addressed three key topics: security, networking, and physical layer transmission.

## Security

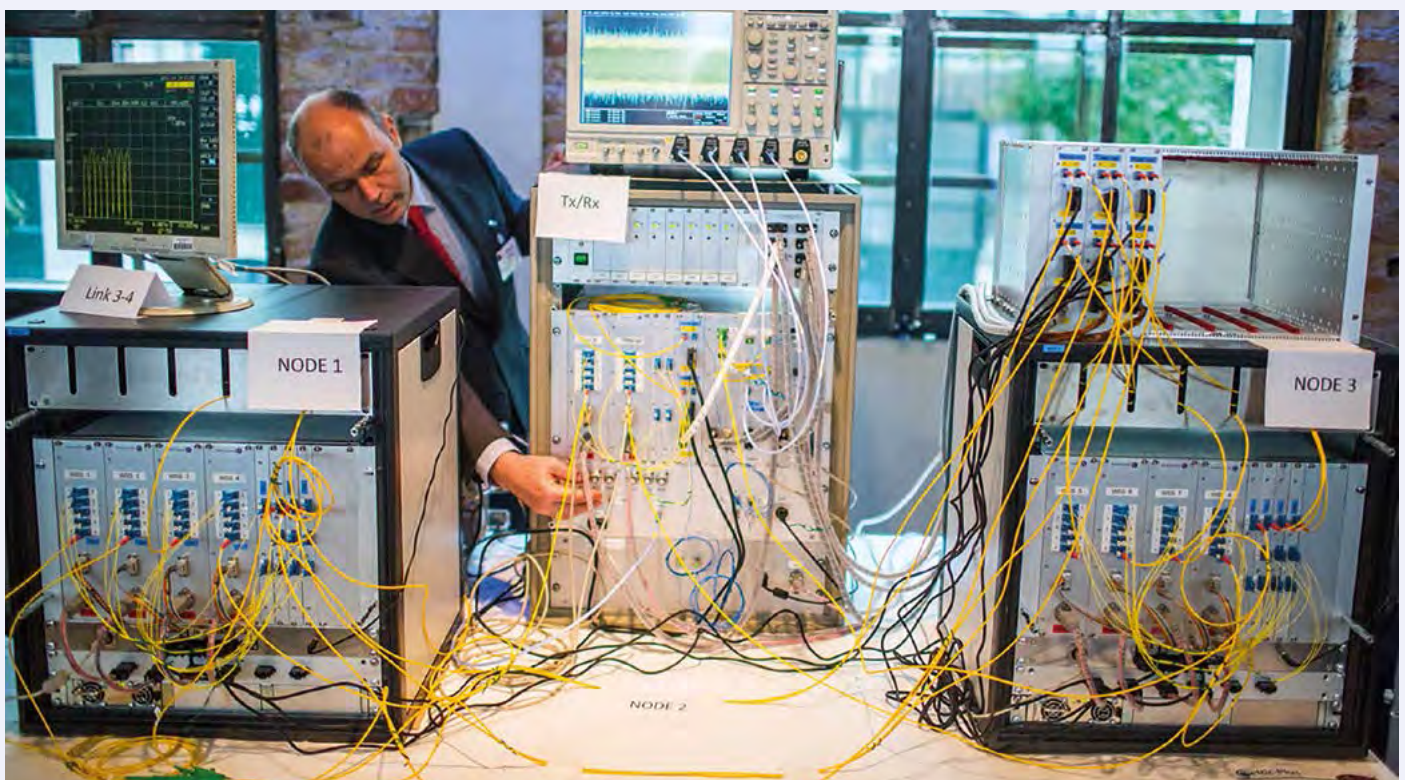
The first topic focused on security, safety, and reliability. A new architecture and operational concepts of highly secure and reliable transport networks were developed and evaluated. This included the analysis of system requirements, system constraints, and new technologies like network virtualization and software defined networking. In addition, the protection of networks

against external and internal attacks was investigated, e.g. backdoor and anomaly detection, and appropriate methods to secure networks were developed. The focus was on the analysis of threats and security requirements of the newly defined network architecture. Finally, safe and reliable transmission was ensured using innovative coding mechanisms.

## Networking

The focus of the second key topic was on scalable, reliable, and energy-efficient network and node architectures taking benefit from low energy optical transport networking techniques. Therefore, centralized vs. decentralized node architectures and their related layer depended functionalities were evaluated. The replacement and reduction of core routers by integrated optical/electrical nodes with different switching granularities and transparent bypassing of IP routers were analyzed, leading to a reduced dependency on IP router solutions.

Furthermore, extensive use of optical switching approaches to bypass complex, energy-hungry electronic packet-processing entities were evaluated, which greatly improve the scalability and feasibility of the 2020 telecoms infrastructure. Another topic in this area was the development of



SASER demonstration





Examining the SASER results (from left): Dr. Andreas Leven, Alcatel-Lucent; Cornelia Rogall-Grothe, State Secretary at BMI – German ministry of the interior; and Dr. Georg Schütte, state secretary at BMBF – German Federal Ministry for Education and Research; Berlin 2014

novel photonic switching technologies for efficient large-scale nodes to overcome scalability and energy limitations of electronic solutions. In addition, a tool for multi-layer optimization of network resources, like e.g. spectral efficiency, with respect to cost, energy, availability, robustness, and switching times was developed.

### Physical layer transmission

The goal in regard to physical layer transmission was to achieve a high spectral efficiency and energy efficient transport of optical signals. Therefore, an adaptive transmission format was developed employing flexible bandwidth channels and using software-defined optics to make optimal use of system spectral resources. Furthermore, the researchers have evaluated and implemented data conversion and digital signal processing schemes for high throughput transmission at low energy consumption. Finally, digital signal processing mechanisms for mitigation of optical components' limitations were developed.

### Results

The SASER partners performed 9 field trials including 4 transmission world records, filed 76 IPRs, and contributed to more than 561 scientific presentations, journals, and conferences. The implementation of 46 demonstrators and 32 prototypes influenced the development / improvement of 20 / 28 products. The successful result transfer into product innovations of the industry partners created high business impact.

On the research side, 118 supervised master and PhD theses contributed to the great research results. In addition, 3 new companies were founded and the partners made 36 standardization contributions including 4 open source software contributions.

### Conclusion

Overall, the SASER project was a very successful Celtic-Plus project. This was confirmed recently at the EUREKA Week in Stockholm 2016, when the SASER project received the Celtic-Plus Excellence Award for Network Technologies.

Already in 2015, during a high-level project closing event, the representatives of the national funding authorities, i.e. the German BMBF, the French DGE and the Finnish Tekes, expressed their high satisfaction with the project outcome concerning its technological and economic impact, and additionally expressed their support for a new funded project, SENDATE, which will investigate new research questions raised by SASER.

- Further information about SASER is available at [www.celticplus.eu/project-saser/](http://www.celticplus.eu/project-saser/)



# IPNQSIS – Service-aware architecture for better Quality of Experience of multimedia services



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The Celtic-Plus project IPNQSIS, IP Network Monitoring for Quality of Service (QoS) Intelligent Support, has been a short-term, product-oriented R&D project. It aimed at improving the customers' perception of multimedia services.

The IPNQSIS project included 18 companies and institutions from Spain, France, Sweden and Finland (see figure 1). The consortium has developed a next-generation management architecture for improving QoE-driven network management.

The main goal for improving telecommunication services was to get a clear picture about how customers perceive the quality of their multimedia services. The project has designed a multimedia services management platform to assure the QoE delivered to end users. The work was performed from a customer perspective, optimizing the QoE. In this way, we have developed mechanisms to monitor and manage services offered on Next Generation IP Networks (IPTV, Mobile TV, VoIP) and to assure the optimal levels of Quality of Experience (QoE) in terms of customer experience management.

## Business impact

The market focus of this project has been on telecommunication operators, and the main business lines in which our technology has been applied are traffic analysis for improving customer experience and reducing network cost, Correlation between QoE-QoS in multimedia applications, and IPTV QoE monitoring and QoE network management. Our technology is making product developments possible that enable greater correlation between the quality of the service and the actual user experience, thereby ensuring greater customer satisfaction.

The results that came out of the project comprise 26 commercial products related to three main business lines that were directly implemented in the market with a mean expected return on investment over the next 3 years of about 10 times the initial investment. Those products



Figure 1: IPNQSIS partners

allow to evaluate the Quality of Experience of multimedia services, such as IPTV, in order to enhance customer satisfaction and, therefore, to improve the quality of life of the citizens.

On the one hand, an essential goal was to get a clear picture about how customers perceive the quality of the multimedia services, and as a result we have developed a suite of products to monitor the customers' experience when using the services of an operator. On the other hand, the project has developed methods to analyse detailed content demand patterns from social media and other services that lead to a better evaluation and understanding of customers' behaviour. Moreover, IPNQSIS has implemented Quality of Experience (QoE) network management capabilities to improve the productivity of the applications, and, consequently, increase customer satisfaction.

### Business and dissemination outcomes

The partners of IPNQSIS have significantly improved their business position in comparison with their direct competitors. In addition, 100 dissemination activities to influence the existing solutions globally have been carried out: 55 papers have been accepted in journals, conferences, workshops and book chapters; 14 exhibitions, booths and poster sessions, 6 contribution to standards (IEEE, ITU-T, ETSI, etc.), 6 commercial presentations, 19 PhD and master theses, and over 20 press and social media releases. Figure 2 shows a summary of the industrial exploitation and dissemination activities.

Finally, we received very good feedback and ideas from customers and end users at our exhibitions booths at the Celtic Event, the Future Network and Mobile Summit, the NEM summit, and

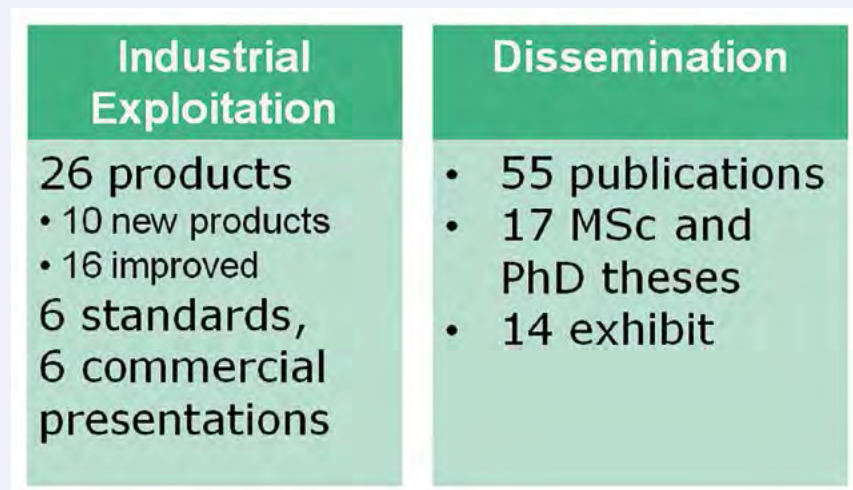


Figure 2: Impact of the IPNQSIS project

other events as well as at commercial presentations for major European telecommunication operators. Besides, IPNQSIS has demonstrated a high level of innovation and business relevance by winning the Celtic-Plus Innovation Award 2016.

### Outlook

The IPNQSIS consortium led by Indra, Spain's number one IT multinational, consisted of 18 members belonging to major companies, universities and research centres.

This work has been partially funded by the CDTI in Spain under PRINCE project, DGCIS in France, VINNOVA in Sweden and TEKES in Finland.

The successful joint business impact achieved by the consortium has led to new research proj-

ects, such as EIT Digital NFMD (Networks for Future Media Distribution) and EUREKA Celtic-Plus project NOTTS (Next generation Over-The-Top multimedia Services). NOTTS extends the scope to OTT (Over The Top) services and offers a promising future in terms of business outcomes.

- You can find more information on IPNQSIS at <https://www.celticplus.eu/project-ipnqsis/>

# IPNQSIS





[www.celticplus.eu](http://www.celticplus.eu)

#### About Celtic-Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new "Smart Connected World" paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the inter-governmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies or universities and research organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

