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**EDITORIAL**

Dear reader,

Celtic has now really taken off the ground and has become a very successful EUREKA ICT cluster since it started in 2003. After the already very successful 4th Call an even better Call 5 followed, where in total 26 project proposals received a Celtic label.

In 2008, we expect to have around 70 projects launched, totalling to a budget of more than 500 million euro and over

5,000 person years of effort. It is also interesting to note that the success rate for project proposals to become a labelled Celtic project is around 70%. Very satisfactory for Celtic is also the fact that the participation of small and medium sized companies has increased to over 30%.

In this issue, we will focus a bit closer on the success factors of Celtic. These are, at first, the very satisfactory projects that finished in 2007, and, secondly, the very much appreciated Celtic Event, with

presentations and showcases of running projects. In the following articles, these points will be further described. Finally, we will present the newly launched 100GET project and the achievements of two recently finished projects.

Heinz Brüggemann  
Director Celtic Office

**Celtic Excellence Award**

**Six projects selected for their outstanding achievements**

*For the first time, 6 completed Celtic projects of call 1 and call 2 have been granted the Celtic Excellence Award for their outstanding achievements.*



Heinz Brüggemann  
Director Celtic Office  
brueggemann@celtic-initiative.org

The award candidates had been selected on the basis of the outcomes from their mid-term and final reviews, where 10 of the most successful projects had been iden-

tified. These projects were then asked to provide additional achievements on the usefulness and further use of the produced results, their impact on new products, new income sources, and new jobs. In addition, influences on standards, patents and the return on investment had been taken into account.

Finally, the following six projects were identified as award winners:

- FIDELITY, which is also selected as "Project of the Year 2007"
- BANITS
- GANDALF
- BUGYO
- Wing-TV
- MADEIRA

In addition, the following projects have been identified among the 10 best Celtic projects:

- ECOSYS
- MACS
- ENCOMPAS
- QUAR2

### Conclusion

It was impressive to learn how successful several of the finished projects were at the end. Their results were, in some cases, directly used to develop new



Award ceremony in Helsinki: Celtic Chairman José Jimenez, Dr. Zwi Altman from the GANDALF project, and Celtic Office Director Heinz Brüggemann (from left)

products or to create new jobs. Furthermore, the return on investment, as far as this could already been estimated, indicated a clear case that the investment in those research activities generated a good return and new income.

All selected projects were already presented in earlier issues of Celtic News. On the Celtic Website at [www.celtic-initiative.org](http://www.celtic-initiative.org), you will find further information on the awarded projects, including the final project leaflets.

## The challenges of the Future Internet for the telecommunications industry

### Third Celtic Event in Helsinki

*From 27 to 28 February 2008 the third Celtic Event took place in Helsinki, Finland. Under the title "Telecommunications and Next Generation Internet" 250 international experts discussed the latest Celtic results and challenges for the future business at the Marina Congress Centre in Helsinki.*

#### Keynotes on innovation

The Celtic Event was opened by Petri Peltonen, Director-General from the Ministry of Employment and the Economy in Finland. In his talk he discussed the new

dimensions in the Finnish innovation policy. According to Mr Peltonen, the Finnish innovation policy is currently moving from a more knowledge-based innovation policy ("knowledge-push") to a more demand-based innovation policy ("demand-pull"). The strongest incentive for innovation is competition and new business opportunities, said Mr Peltonen. He expects that by 2015 the number of innovative firms in Finland will have doubled.

In another keynote speech, Hannu Nurmi from Tekes presented the new strategic



Heinz Brüggemann  
Director Celtic Office  
[brueggemann@celtic-initiative.org](mailto:brueggemann@celtic-initiative.org)

centres for science, technology and innovation in Finland. In the first phase there will be five non-profit strategic centers: the forest cluster, metal products and



mechanical engineering, energy and environment, health and well-being, and ICT industry and services. The mission of these strategic centers, which are currently defined and set up, is to create new global ICT-based business ecosystems. A strong international collaboration is considered as essential and will be supported.

The Celtic chairman José Jimenez from Telefónica gave an overview on the current status of Celtic. He explained three major research lines, focusing on the challenges of telecommunications and the next generation Internet. These research lines should concentrate on new income sources from new multimedia services, on new personalised services by looking at new service platforms, and on better operations by investigating new infrastructure solutions including mobile. He explained how far these research lines are already covered by Celtic projects and which gaps still need to be filled.

Dr. Aleš Mihelič, the EUREKA Chairman of the Slovenian EUREKA Chairmanship, presented the position of EUREKA towards the new challenges. EUREKA has strong advantages of being close to the market, responding faster and easier to the needs of the industry, among other aspects, also related to the bottom-up approach, said Dr. Mihelič.

Luuk Borg, the head of the EUREKA secretariat, presented the new EURO-STARS initiative, which is particularly targeted at providing funding for SME-driven projects.

On the second day, Daniel Kofman, professor at Telecom ParisTech and CTO of RAD Data Communications in Israel, presented his thoughts on the next



generation Internet and its impact on telecommunications.

His talk was followed by the speech of Dr. Joao Schwarz da Silva, Director of Converged Networks and Services in the Information Society and Media DG of the European Commission, who discussed the European view on the Future of the Internet and the currently planned activities in this important field.

#### **Panel discussion**

At the panel discussion, chaired by the EUREKA chairman, Dr. Aleš Mihelič from Slovenia, representatives of the Public Authorities and of some successful projects discussed how the results could be better transformed into products, and how the return on investment could be further increased.

Tiina Nurma from Tekes stressed that the main focus on research within EUREKA is expected to be industry-driven, focusing on the shorter-term needs of the industry. Exploitable results are therefore essential. Innovation needs network actions; no innovation without sufficient and international consortia.

Jonas Wallberg from Vinnova Sweden reminded the audience that it generally takes more than five years until results are turned into products. Experiences of Celtic are positive, as it offers a good framework for co-operation, involving many small and bigger organisations, which can gain a lot.

New strategies of Celtic are very important, and there is a need to align the strategies with the national research programmes. Jesús Cañadas from the Spanish Public Authority gave a presentation on the Spanish experience with Celtic projects and their results. The highest interest of the Spanish government is the generation of products as important outcome from projects. Celtic is a way to create synergies between the ETP. There will be again substantial increases in funding.

Dr. Effi Bergida from the Israeli Public Authority gave an overview on Israel's Celtic participation. Israel has a very high investment in R&D, which is over 4.5% of the GDP. As the local market is very small, the international aspects, in particular international R&D, have a high priority; cooperation with Europe is the highest.

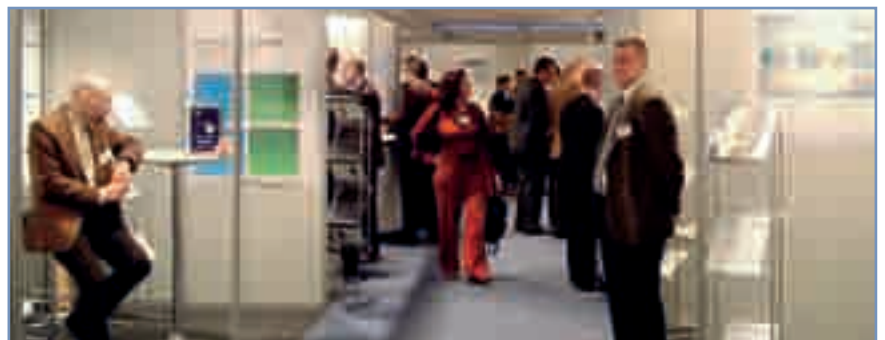


One particularly important requirement for commercially exploiting project results is a short time to market. The weak point in EUREKA is particularly the long duration of occasionally over one year, which is sometimes required to agree on funding and to start a project. This long duration needs to be shortened, if Celtic wants to stay close to the immediate market needs, said Dr. Bergida.

Furthermore, the views from the industry, expressed by successful project participants, on the positive and negative aspects of R&D within the EUREKA framework were presented in the panel discussion. Bertrand Marquet from the BUGYO project explained that his first experience of a EUREKA-type project was extraordinarily positive. He proposed that projects should consider an advisory board to assure cross-domain collaboration. Luis Perez Roldan from Telefonica, responsible for the BANITS projects, presented results on newly generated business, new jobs, and new products. These positive outcomes have strengthened the competitive positioning of the project companies. Ilari Welling from Nokia Siemens Networks, responsible for the project ECOSYS, provided the experiences from his projects. The results were of more immaterial nature and were not intended to directly lead to new products.

In the panel the question of providing some kind of "after-sales service" beyond the projects' lifetime was discussed. There is obviously a lack of information provided to the public and to tax payers.

After the panel discussion, speakers from two of Celtic's largest projects, B21C and 100GET, gave an introduction on their work. B21C is dealing with the validation of digital broadcast standards based on DVB-H and on the elaboration of DVB-SH (hybrid satellite/ terrestrial broadcast)



as well as on the next generation terrestrial standard DVB-T2. The project is very large with 35 organisations from 9 countries involved, covering a budget of about 20 million euro.

The largest ongoing Celtic project is 100GET, working on 100Gb/s carrier grade Ethernet transport networks. This project has a budget of around 60 million euro, and it includes 37 partners from 4 countries. In his presentation, Kurt Loesch from Alcatel-Lucent explained the project plan and the expected results.

In the final presentation, Anastasius Gavras from Eurescom, coordinator of EU-funded FP6 project Panlab, provided an overview

on the current status of the Panlab activities and the future expectations and concepts for using the Pan-European Laboratory as a flexible platform for Future Internet research.

### **Exhibition**

In the parallel exhibition, 20 Celtic projects, including some Finnish projects of the Tekes GIGA programme, presented their results. The outstanding Celtic project results shown at the exhibition included, among many other items, a medical robot operated over a DSL connection and a HDTV multicast distribution service and

a P2P HDTV service over a RPR ring (BANITS-2). Furthermore there was a demonstration of recovery mechanisms and network performance (TIGER), a real-time demonstration of the performance of the DVB-SH air interface (B21C), and a wireless traffic service platform for linking cars (CARLINK).

Several Finnish organisations and companies, largely included in the Finnish GIGA programme, also joined the exhibition by presenting their results and contributions to Celtic projects.

Further information is available on the Celtic Event website at <http://www.celtic-initiative.org/Events/Celtic-Event08-Helsinki/welcome.asp>

# New Celtic project 100GET develops 100 Gigabit Ethernet

## More bandwidth and security for the Internet of the future

*A new Celtic project has started to work on innovative technical solutions that will lead to more bandwidth and security in the Internet backbone networks. Celtic project 100GET works on a giant leap in the evolution of transport technology – the development of 100 Gigabit Ethernet.*

100GET is currently the biggest Celtic project. It has only recently been launched and is organised as four connected sub-projects, coordinated under the 100GET umbrella.

“The strong growth of traffic in data networks and high pressure on transport costs will soon lead to a strong demand for next-generation Ethernet technology. 100 Gigabit Ethernet is the next logical step after today’s 10 Gigabit Ethernet,” said 100GET’s project coordinator Kurt Loesch from Alcatel-Lucent.

The traffic on the Internet is increasing at a rapid speed. More bandwidth in the metro and core networks is required to cope with this steady increase.

From mid-2006 to mid-2007, Internet traffic grew by more than half (57 per cent). Bandwidth-hungry applications in areas like music or video downloads, e-commerce, web-based training, and telemedicine will further push Internet traffic to its limits, requiring more capacity in the Internet backbone. New Internet services and applications are increasing the demands on transmission capacity, security, robustness and quality of network connections in core, metro, and access networks.

Celtic project 100GET addresses this challenge by expanding the capacities of the Ethernet networking standard, which will be the dominant transport technology of next generation metro and core networks. The main goal of 100GET is to develop carrier-grade transport networks based on a data transmission rate of 100 billion bits per second over Ethernet at high quality.

Partners in the 100GET project include leading companies and research institutes in the field of communications



Heinz Brüggemann  
Director Celtic Office  
brueggemann@celtic-initiative.org

technology like ADVA Optical Networking, Alcatel-Lucent, Ericsson, Nokia Siemens Networks, and Deutsche Telekom, and Fraunhofer Heinrich-Hertz-Institute. There are altogether 37 project partners from Germany, France, Sweden, and Finland. 100GET has a duration of three years until 2010 and has a budget of nearly 60 million euro. It is co-funded by the German Federal Ministry of Education and Research (BMBF), the French Minis-



try of Economics, Finance and Industry, the Swedish Governmental Agency for Innovation Systems (VINNOVA), and the Finnish Funding Agency for Technology and Innovation (Tekes).

Further information is available at  
<http://www.celtic-initiative.org/Projects/100GET>



100GET project presentation in a video film produced by BMBF, the German Federal Ministry of Education and Research

# DeHiGate – Deployable High Capacity Gateway for emergency services

*The Deployable High Capacity Gateway empowers the public safety and security authorities with a complete solution for emergency data services. The prototype integrates existing wireless technologies (Wi-Fi, WiMAX, and 3G) with TETRA/TEDS and complements them with innovative applications for network optimization and self-configuration. The broadband features in combination with PMR voice services satisfy the user demands for remote surveillance, tracking, navigation and safety.*

## Innovative/Usability Aspects

The emergency units are deployed in a clustered manner and they employ existing WLAN technology to provide broadband data services. They are flexible to operate in multiple urban and rural emergency scenarios as well as in building search and rescue. The link quality in the presence of heavy environmental clutter is improved by utilizing directional antennas.

## Deployable gateway

The deployable gateway prototype itself provides auto configuration and multi-topology routing services to the emergency network in order to enhance connectivity with command & control centre and application servers in the backbone. The multi-topology feature of the gateway utilizes a wide range of access technologies that are selected according to the application type and the network availability.

## Network management system

The network management application (AQD Software) integrated with GIS collects status information from all entities in the network and improves the situational awareness at the local and remote operational leaders. It also assists in maximizing the network performance and resource utilization by tuning radio parameters and network structure.

## Field demonstrations

The usability of the underlying concept will be presented on the DeHiGate demonstration day in Kuopio, Pelastusopisto,



Aamir Mahmood  
Helsinki University of Technology  
aamir.mahmood@tkk.fi



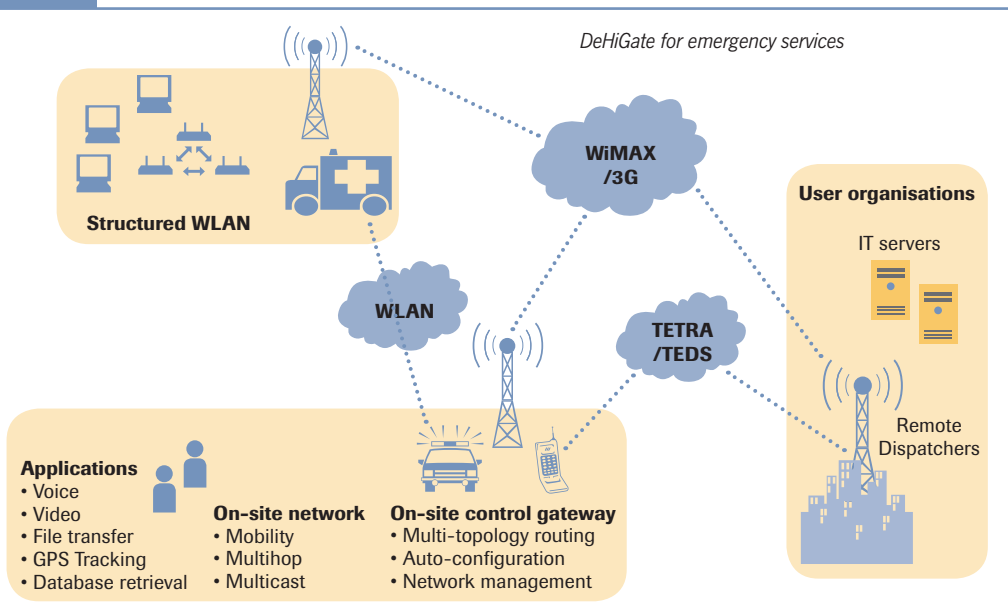
Konstantinos Koufos  
Helsinki University of Technology  
konstantinos.koufos@tkk.fi



Dr. Krisztina Cziner  
Helsinki University of Technology  
krisztina.cziner@tkk.fi



Vidar Karlsen  
Thales Norway AS  
Vidar.karlsen@no.thales.com





Finland on 18th April 2008, where key public safety users are invited to evaluate the DeHiGate system.

#### **Consortium members**

The DeHiGate consortium consists of the following member companies: Thales Norway AS, University Graduate Center (Norway), Applica AS (Norway), Helsinki University of

Technology (Finland), EADS Secure Networks (Finland), State Security Networks (Finland), Telefónica (Spain), and Iber-X (Spain).

For further information please visit the DeHiGate website [www.dehigate.org](http://www.dehigate.org), or contact the project coordinator [vidar.karlsen@no.thales.com](mailto:vidar.karlsen@no.thales.com) or [aamir.mahmood@tkk.fi](mailto:aamir.mahmood@tkk.fi).

## Optimized Transponders For Robust Optical Networks

### **A video-on-demand architecture with QoS**

*The OPTRONET project focused on studying efficient optical modulations for advanced optical network design that facilitate the scaling of existing 10Gb/s systems to 40Gb/s and higher. Different scenarios involving challenging fiber impairments, such as dispersion and non-linear propagation, were considered and evaluated against current solutions. The proposed improvements include efficient and adjustable electrical dispersion compensation at the initial and/or final link nodes.*

#### **Approach**

The main physical limitations for high-speed transmission reside in the properties of optical fibers. Uncompensated (residual) chromatic dispersion, non-linear effects (e.g. self-phase modulation and cross-phase modulation among others) and polarization mode dispersion (PMD) become limiting factors in WDM systems, when 40 Gb/s signals are considered. The OPTRONET project addressed these issues by studying modulation formats that either yield reduced channel spectral

occupancy (such as Optical Single-Side Band) and/or facilitate electrical and optical pre and post-processing to mitigate the system impairments. In addition, passive electrical compensation solutions resorting to dispersive transmission lines and active solutions based



on adaptive post-detection electrical compensators implemented as transversal MMIC devices were evaluated (see figure 1). Experimental implementations of the proposed solutions were performed with results that outperform conventional approaches.

#### **Main results and achievements**

Two new optical single-side band modulators were developed based on opto-electrical adaptive filters which suppress one sideband of conventional IM-ODSB signals. Such implementations yield important advantages such as wavelength independent operation, no intensity distortion and significant sideband suppres-



*Paulo Monteiro  
OPTRONET Project Coordinator  
Nokia Siemens Networks Portugal  
[paulo.l.monteiro@nsn.com](mailto:paulo.l.monteiro@nsn.com)*



*Daniel Fonseca  
OPTRONET Technical Manager  
Nokia Siemens Networks Portugal  
[daniel.fonseca@nsn.com](mailto:daniel.fonseca@nsn.com)*

sion compared to conventional filtering techniques. The importance of these features resides on the possibility of system upgrading by a simple add-on with minor requirements from the existing equip-

ment. In addition, due to the innovative step of such opto-electrical proposal, international patents have been submitted. A different area of investigation within the OPTRONET project has been signal processing resorting to electrical pre-distortion before modulation. Results show that, together with OSSB modulation, significant extension of transmission distance is possible, leading to a system virtually unaffected by the accumulation of optical chromatic dispersion [1].

On the receiver side, the inclusion of fixed and adaptive electrical compensators allowed for compensating 408ps/nm of GVD or 18ps of DGD with less than 1.3dB optical signal-to-noise ratio penalty to back two back at 40Gb/s, yielding the best experimental results published so far on dispersion impairment analogue mitigation at this bit rate. Experimental results with the adaptive compensators have shown that impairments such as optical bandwidth limitation and signal distortion are also effectively tackled. A detailed reporting and analysis of our findings can be found on [2].

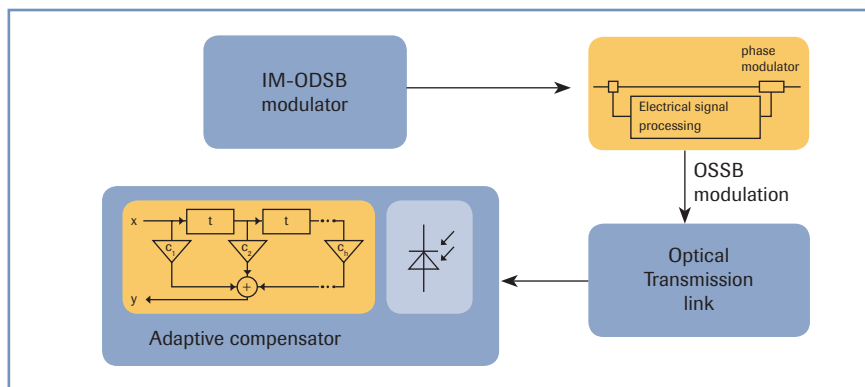


Figure 1: System setup highlighting main contributions

Further research on new methods for implementing fully integrated opto-electrical OSSB modulators and tunable passive/active highly dispersive electrical compensators is currently ongoing.

### Conclusions

The OPTRONET project represented an effort to demonstrate, both theoretically and experimentally, that significant increase is possible in transport capacity of installed fiber networks to allow these to cope with 40Gb/s traffic while enabling significant cost saving in required optical infrastructure upgrade. Solutions were proposed for efficient modu-

lation formats that are transparent to the channel spectral occupancy and yield superior results when combined with electrical compensation. Compensation schemes focused on the development of integrated optical and electrical devices that are viable to both WAN and MAN applications.

### References:

- [1] IEEE/OSA JLT, vol.25, No.8, pp.2175-2186, Aug.2007
- [2] PTL, vol.19, No.18, pp.1356-1358, Sep. 2007

### IMPRINT

Editor-in-Chief:  
Heinz Brüggemann  
brueggemann@celtic-initiative.org

Contact:  
Celtic Office  
c/o Eurescom GmbH  
Wieblinger Weg 19  
69123 Heidelberg, Germany  
Tel: +49 6221 989 405  
Fax: +49 6221 989 451

### About Celtic

Celtic is a Eureka cluster programme, which initiates and runs privately and publicly funded R&D projects in the field of telecommunications. The cluster, which runs until 2011, is supported by most of the major European players in communication technologies. Celtic projects are focusing at telecoms networks, applications, and services looking at a complete system approach. The size of the Celtic budget is in the range of 1 billion euro. Celtic is open to any kind of project participants from all Eureka countries.