ICT and sustainability

FIREWORKS

FIREweek 2009

FIRE and Living Labs – Future Internet by the people
Lulea, Sweden, 1 – 2 July 2009

Photo: Lena Nilsson, Luleå

Photo: Lena Nilsson, Luleå

As a part of this year's FIREweek, FIRE (Future Internet Research and Experimentation) and the Living Labs community are jointly organising a conference with the title "FIRE & Living Labs – Future Internet by the people".

The focus of the conference is on multidisciplinary and participatory experimental research on the Future Internet. One of the topics is to address how FIRE and the Living Labs movement can work together, and to discuss how users can add value to Future Internet research.

The conference is organized by the European Commission, the FIREworks project, the CO-LLABS project, and the Centre for Distance spanning Technology at Luleå University of Technology. The event is held in cooperation with the projects from the FIRE portfolio and the European Network of Living Labs and in association with the Swedish EU presidency in the second half of 2009.

Target audience
The target audience includes experts from both the FIRE and Living Lab communities, academia, industry, ongoing research projects, public authorities, the European Commission, and international organisations.

Venue
The House of Culture and CDT-LTU campus, Lulea, Sweden

Registration
Participation on the first day, "Future Internet by the people", is free of charge; for the second day, "Tutorials and workshops", the registration fee is 150 euro. For both days, registration is required. The registration deadline is 15 June 2009.

Further information
Further information about the event is available at *www.ict-fireworks.eu/events/fireweek-2009-in-lulea.htm*l

Dear readers,

When we planned this issue of Eurescom mess@ge, we thought that 2009 could become the year of ICT and sustainability. The European research year actually started accordingly with a high-level conference on "ICT for a Global Sustainable Future", organised by the EU-funded PARADISO project (www.paradiso-fp7.eu) in Brussels in January. High-level keynote speakers – including Viviane Reding, Commissioner for Information Society and Media, and Hamadoun I. Toure, Secretary General of the International Telecommunication Union – confirmed that only with the help of ICT will we be able to master the challenges posed by resource scarcity, CO_2 emissions, climate change, and other environmental hazards.

From January to April 2009, sustainability has been increasingly pushed aside on the public agenda by the economic and financial crisis. Although experts like future-trends guru Jeremy Rifkin have convincingly argued that economic crisis, energy issues and environmental issues are closely linked, the economic recovery plans so far have only to a limited extent considered sustainability issues.

However, the fact that sustainability issues have temporarily disappeared from the public radar does not mean that nobody cares about them. The new US administration has confirmed their determination to tackle climate change and increase the share of renewable energy sources. The EU's 20/20/20 goals are still valid; the EU is committed to cutting primary energy consumption by 20 percent and increase the production of renewable energy to a share of 20 percent by 2020. And in the ICT industry, the trend towards energy efficiency and sustainable use of resources seems to have gained some momentum beyond politically correct showcases.

European ICT research projects have for many years explored ways for increasing energy efficiency and using resources more sustainably. Although the global growth if ICT in itself has posed environmental challenges, ICT has also the potential to solve its own environmental problems and those of other sectors as well.

Although you will find in the cover theme of this issue mainly ICT solutions targeted at increasing energy-efficiency, the topic ICT and sustainability has far wider implications that also include the social dimension of fair access to resources and to the global information society. As the recent ITU report on the ICT Development Index found out, the digital divide has not changed despite some progress in developing countries. For ICT to become fully sustainable on a global scale, it will be important to overcome the divide between the digital haves and have-nots within the coming decade.

Milon Gupta
Editor-in-chief

Events calendar

4 May 2009
eMobility Coordination workshop on FP7 Call 5 proposals
Paris, France
www.emobility.eu.orgl

11–13 May 2009
Future Internet Conference
Prague, Czech Republic
www.fi-prague.eu

20 May 2009
Managing ICT projects in FP7 – Best practices from TA2
Heidelberg, Germany
www.ta2-project.eu/events/seminar2009.html

25–27 May 2009
ICT 2009
Marrakech, Morocco
www.ict09.org

10–12 June 2009
ICT Mobile Summit 2009
Santander, Spain
www.ict-mobilesummit.eu/2009

14–18 June 2009
ICC 2009
Dresden, Germany
www.ieee-icc.org/2009

18 June 2009
Future-Net '09
Dresden, Germany
www.future-network09.org

18–23 June 2009
MESH 2009
Athens/Vouliagmeni, Greece
www.iaria.org/conferences2009/MESH09.html

29 June – 3 July 2009
FIREweek 2009
Luleå, Sweden
www.ict-fireworks.eu/events/fireweek-2009-in-lulea.html

7– 8 July 2009
IPTComm 2009
Atlanta, Georgia, USA
iptcomm.org

28–30 September 2009
2nd NEM Summit
Saint-Malo, France
www.nem-initiative.org/public/Summit/Summit.asp

Sn@pshot

Killer device

Here is the latest killer device from Naples. At an early morning raid against the Camorra, the Naples-base version of the mafia, police found a gun disguised as a mobile phone on a property near Naples. The .22 calibre device can hold four rounds; each one can be fired in quick succession through the antenna using buttons on the keypad as the trigger.

ICT
and sustainability

**Hamadoun I. Touré ITU
Secretary-General**

CELTIC
N • E • W • S

Obama' s BlackBerry –
A security risk?

The Eurescom study programme 2009

Anastasius Gavras
Eurescom
gavras@eurescom.eu

One of the strengths of the Eurescom community is its commitment to engage in short and focused collaborative studies. The Eurescom study programme is an instrument that enables the efficient setup and execution of such studies. The programme is financed by its subscribing members and their commitment is underwritten by their upfront payments to the programme's budget.

The Eurescom study programme continues to demonstrate its flexibility in bringing together leading experts from its members to address topics of common interest. Eurescom studies develop conclusions on specific topics and pave the way for larger collaborative initiatives.

The fundamental working principle within the Eurescom study programme is collaboration. Any network operator or service provider may become a subscriber of the study programme and participate in it, if he shares the interest of having the substantial issues facing the telecoms industry addressed in a collaborative way. The results of the studies are exclusively available to the members of the programme, so that the study subscriber organisations benefit from a direct competitive advantage from collaborative work. The study programme participants are invited to look beyond the R&D units in considering study topics so that business units get the opportunity to benefit from the study programme results.

Studies can be used to scope an issue in preparation of a large initiative potentially for public funded projects, for example EC/FP7 or EUREKA Celtic. In its last meeting the study management group took an action to identify common interests among the participants at an early stage in order to facilitate the team building for the later execution of the studies. This is particularly important in view of the upcoming calls and deadlines of the programmes.

Another important aspect that is likely to impact the programme in the future is the recommendation of several experts to re-focus the programme and identify the topics in a top-down manner, rather than in a bottom-up manner, which is currently largely the case.

At the publishing date of this article, the proposals from the first call in 2009 will have been assessed and studies will start before the summer 2009 break.

For more information on the study programme, or if you are interested to subscribe to the study programme, please visit the Eurescom website at *www.eurescom.eu*

Copyright protection

Why the "three strikes" solution doesn't work

David Kennedy
Director of Eurescom
kennedy@eurescom.eu

In discussions on copyright protection today, there is a strong lobby group of copyright owners. They are pushing for European legislation to adopt rules that anyone caught illicitly downloading copyrighted material more than twice should be barred from the Internet. This is a very short-sighted approach to a complex problem.

The point that people are taking content like music, videos or games without paying is clearly correct, and the people who have produced such content should be properly compensated for consumption of their product. Here we have no disagreement.

The problem I have with the proposed "three strikes" solution is that it ignores years of common practice and therefore will be very difficult to enforce. The risk is high that it will result in alienating a large sector of society, undermining of trust and confidence in the Internet Service Providers (ISPs), and even creating a situation where the basic rules of proof and justice are undermined.

The questions are huge: who will determine when copyright has been infringed, and how can anyone even know what you are downloading without infringing your privacy? Even more critical: what rights does an individual have against such accusations?

The social aspect

Why we really have to be careful is that the young people of today have grown up with the Internet and, unlike previous generations, they have become part of a society that finds what it wants when it wants in the online information world that we call the Internet. If we now turn around and implement laws that put an onus on these young generations to try and validate everything they download, at the risk of becoming criminals, it will be viewed as a loss of freedom.

France is considering a "three strikes" law, but they must be aware of the potential impact on society, if a large section of the youth feels disenfranchised. To criminalise people who share music is a disproportionate response, when the core of the problem is that we need more innovative business models. Let us find a way to remove the crime rather than making people criminals.

There is a great emphasis by copyright owners to protect their property these days on the basis that the authorities should do something, as they are loosing lots of money. One of the reasons they are loosing money is, because they are more concerned about protecting their existing business models from losses than migrating to a positive innovative plan that generates new revenues and ensures all players in the value chain get adequate compensation for their value they have created and added.

A new business model

Maybe what we need to be thinking about is if, as an alternative to labelling the online half of society as criminals, we find a way to pay for the content. How can we do this?

Should every ISP collect 10 euros per month from each customer to give to the content generators?

If even half of the 500 million people in the member states of the European Union paid this, we would have 2,5 billion euros a month to pay for content. That is 30 billion a year – probably not enough, so we will still have some premium content that is sold on an individual basis.

However, it is enough to liberalise the energy we have for evolving from over-protection of old business models towards creating innovative business models.

Abuse of power

If you are still not convinced about the need for new business models, think about the administration of the "three-strikes" process. Some of the discussion today is based on forcing the ISPs to be the police of the Future Internet, and this is neither logical nor fair. The ISPs are expected to block sites that the content industry declare as hostile without any formal process or proof. The point is that we do not want a vigilante approach to the Internet just as we don't want it in the real world.

Don't make criminals out of people, when the problem is we just haven't found the right new business model.

Sustainable ICT and energy efficiency

Halid Hrasnica
Eurescom
hrasnica@eurescom.eu

In the long history of human existence on Earth, securing energy resources and exploiting them efficiently has played a very important role. On a socio-economic and political level, the consumptive needs for energy and scarcity of energy resources have strongly influenced energy production, our environment and our quality of life. Two major trends have recently stimulated the need for reducing energy consumption and improvements in energy production: increasing energy costs, which reflect the steep rise in demand and the scarcity of carbon-based energy resources, and increasing CO_2 emissions caused by carbon-based energy consumption, which are contributing to negative climatic changes.

Accordingly, the reduction and optimisation of energy consumption are among the main goals of the European Union. At the end of 2006, the EU set its ambitious 20/20/20 goals to cut its annual consumption of primary energy by 20 percent and increase the production of renewable energy to a share of 20 percent by 2020

and adopted a corresponding Action Plan for Energy Efficiency (2007-12). The achievement of these goals will only be possible through mobilising public opinion, decision-makers and market stakeholders and by setting minimum energy efficiency standards and rules for products, services, and infrastructure. In the ICT work programme of EU Framework Programme 7 (FP7) for the period 2009-2010, the European Commission clearly addresses issues related to the application of ICT for energy efficiency, climate change adaptation, and smart electricity distribution and calls for significant research work to be done in this area in the next years.

There are two major aspects to be considered in regard to ICT and energy efficiency:

- Energy efficiency in the ICT sector, where energy savings are particularly envisaged for the ICT infrastructure, and
- Energy efficiency in all areas of production and consumption, in which ICT can help to achieve the EU's 20/20/20 goals related to more effective energy production and distribution as well as energy consumption by end users.

Related to the first aspect, the ICT industry is aiming to reduce the energy consumption of mobile devices, for example by ensuring a longer life-time of batteries and sensors, and, more importantly from a global point of view, by reducing overall energy consumption within the ICT infrastructure. Significant efforts are made in developing new, less energy-consuming transmission methods and communica-

tions protocols. In addition, innovative solutions are developed for ICT devices and network equipment, which aim at reducing and optimising energy consumption in stand-by mode.

On the other hand, ICT resources, which include a number of intelligent devices, high-performance computer systems, and widely deployed communications network, can improve energy efficiency in different ways. Thus, ICT systems are already successfully used to optimise electrical energy distribution and production and are continuously improved taking advantage of recent research results in the ICT area. Various possibilities for optimising both industrial and private consumption of electricity are applied and further investigated, in order to achieve a reduction of related costs and to adapt to time-variant electricity supply. Furthermore, integration of alternative energy sources in global supply networks, in particular small wind or water electricity plants, requires significant improvement of the distribution networks and management of expected bi-directional energy flow. Finally, even though the main part of measures applying ICT for energy efficiency considers electrical supply networks and consumption, ICT can also be successfully applied to improving the efficiency of other energy sources and their distribution in a similar way.

Reducing CO$_2$ emissions at home – The AIM project

Spyros Tompros
Keletron
stombros@keletron.com

Climate change can be attributed to several factors associated to human activity. The most important among these factors are CO$_2$ emissions. As households have the largest share among CO$_2$ emissions, the EU-funded research project AIM is focusing on ways for increasing energy efficiency in the home.

Governments around the globe have taken actions for reducing CO$_2$ emissions, as they have recognized the fast-changing pace of climate change and its devastating effects on our lives. The need of industrialized countries to minimise CO$_2$ emissions has led to worldwide disccussion in the context of the Kyoto protocol about applicable strategies for control and real-time management of CO$_2$ emissions. As statistics show (see figure 1), CO$_2$ emissions differ by sectoral activities.
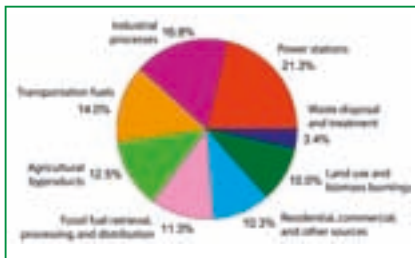
Figure 1: Annual CO$_2$ emissions by sector (source: Climate Change 2001: Working Group I: The Scientific Basis)

The residential area accounts for the largest part of CO$_2$ emissions, considering that about 35 percent of the energy production of power stations is consumed by households. This leads us to the question, how effective existing CO$_2$ control mechanisms are for households.

Massive installation of smart metering devices could solve the problem of energy metering, and thus address the issue of calculating CO$_2$ emissions, but at the expense of extra energy. The alternative: recently emerged technologies enable the automated calibration of energy consumption on the basis of user-configurable thresholds.

The AIM approach

Looking at the energy control problem from a different perspective, the AIM project positions the user in the center of energy management mechanisms. The main objectives of AIM in this respect are to develop management mechanisms for

Figure 2: AIM concept and outline of network architecture

ultra-low energy consumption and to establish a user-centric approach in energy management that is based on the concept of "user programmes". With this approach, AIM will create awareness among people on the environmental impact of the use of household appliances. Understanding how much energy an appliance consumes, gives users an active role in the fight against global warming by reducing power usage in the household.

As an alternative to approaches based on an energy metering architecture, AIM has developed a profiling technology that allows determining the energy consumption of household appliances via user programmes. Thus, even inexperienced users will be better able to realise how much energy is spent, when an appliance is switched on or is left in standby mode.

In comparison to existing energy saving solutions, the AIM system does not require extra components and exploits any home network infrastructure for the exchange of status and control messages between the central monitoring mechanism and the appliances (see figure 2).

At the core of the AIM concept is the Energy Monitoring Device (EMD), which is based on the concept of message exchange in the implementation of energy control applications. For households equipped with networked appliances, EMD is a slim software entity hosted on the residential gateway that "talks" to the respective appliance whenever the predefined energy consumption level is exceeded.

AIM's real-time energy monitoring implementation does not require smart metering devices, as the network "understands" the appliance programmes and calculates on the fly the total energy consumption levels, using the corresponding energy profiles.

Extending its concept to the whole value chain of energy generation, supply and use, the AIM solution will also stimulate wider solutions for applying energy control in order to increase user awareness on other critical environmental aspects, such as the preference of renewable energy sources and rationalised energy usage around the clock.

The AIM solution is currently in the implementation phase, promising 20 percent of energy saving for active devices and close to 100 percent energy saving for devices in stand-by mode.

Further information on the AIM project is available at *www.ict-aim.eu*

"A major part of the solution"

Interview with ITU Secretary-General Hamadoun I. Touré on ICT and sustainability

Standards can have a major impact on the sustainability of information and communication technology (ICT). Eurescom mess@ge editor-in-chief Milon Gupta asked Dr. Hamadoun I. Touré, the Secretary-General of the International Telecommunication Union (ITU), a major global standardisation organisation, about his views on ICT and sustainability. Besides standardisation and radio-spectrum allocation, the ITU is also pushing for access to ICT in developing countries. The development aspect is of high importance to the sustainability discussion, and it is of particular interest to Dr. Touré, who played a key role in developing satellite communications in Africa.

How can ICT contribute to a global reduction of greenhouse gases?

Touré: We know that the ICT sector produces some 2 to 3 per cent of total emissions of greenhouse gases. We are also aware that this share will increase with growing ICT use as we roll out more broadband and more mobile networks.

But while ICTs contribute to global warming, we must also acknowledge that these technologies are a critical tool in helping to reduce greenhouse-gas emissions. At the same time as the ICT sector is making strong efforts to limit and reduce its own carbon footprint, ICTs can be used in other economic and social sectors to reduce their greenhouse-gas emissions.

For example, ICTs can eliminate the need for some travel and improve transport efficiency, helping to cut the carbon footprint of individuals and companies. And in these times of financial crisis any means to reduce unnecessary travel will be grasped by hard-pushed companies, underlining the need for fast tracked development of these technologies.

ICTs help to spread the knowledge needed to mitigate and adapt to the effects of climate change more generally and provide a platform for the development of more energy efficient technologies.

In fact, ICTs are a key enabling technology that can be used to combat climate change in all sectors, including through intelligent transport systems, smart buildings, better supply chain management and

monitoring of global warming. In short, ICTs are a relatively minor part of the problem, but a major part of the solution.

Estimates vary, but ICTs could help cut global emissions by between 15 and 40 per cent.

What is the ITU doing to make ICT part of the solution in addressing climate change?

Touré: International coordination in the mitigation of climate change is crucial. For its part, ITU is spearheading international efforts in the field of ICT and will contribute its findings into the wider international effort. At the same time, ITU is helping its membership, particularly developing countries, to adapt to climate change.

ITU has activities on climate change that cut across all of its sectors. For example in the Radio sector we are working on the identification of the necessary radio-frequency spectrum for climate monitoring by satellites and disaster prediction, detection and relief. ITU has cooperated with the World Meteorological Organization and other international agencies in the development of systems involved in climate monitoring for many years and just recently we have started work with WMO in the field of remote-sensing applications.

The Development sector of ITU has a strong focus on raising awareness and helping developing countries to mitigate climate change and sustainability issues. ITU together with the United Nations Environment Programme, UNEP, supports an initiative of ICT service providers and suppliers called the Global e-Sustainability Initiative. The initiative will provide direct assistance to countries on policies and strategies for the harmonized co-existence of man and the environment through the use of ICTs.

ITU is also continuing to help developing countries to implement solutions to mitigate the effects of climate change and severe weather events through the use of emergency telecommunications and alerting systems for disaster relief.

And, as the preeminent global body for standardization in the field of ICT, ITU is working to limit and ultimately reduce greenhouse-gas emissions and foster sustainable development, in particular by promoting the use of more energy efficient ICT devices and networks and the development of technical standards, called Recommendations, to limit and reduce the power requirements of ICT equipment and services. We are also working on metrics that will enable better reporting by ICT companies on exactly what their carbon footprints are.

ITU will share knowledge and best practices on the clean production and use of ICTs and how they can be used as a tool to assist countries, in particular developing countries, to mitigate and adapt to climate change. For example we recently produced a toolkit to provide guidelines for developing countries on how to use ICTs for better management and protection of the environment.

The potential role of ICTs in promoting environmental protection and sustainable development was first recognized in ITU back in 1994. Our activity in this area was given a significant impetus by the UN Secretary-General when he visited ITU headquarters in 2007 and stated that ITU is one of the most important stakeholders in terms of climate change and encouraged us to play a greater role. The Secretary General reemphasized this in a message he sent to the recent High Level Segment of ITU's Council.

ITU's work on ICTs and climate change was also given a boost with the publication of our Technology Watch report on ICTs and climate change in early 2008. To build our knowledge base, we held major symposia in Kyoto and London to consider the link between ICTs and climate change and will hold more such symposia in the coming year. And at the recent United Nations Climate Change Conference, in Poznan, Poland, ITU hosted a session to increase awareness and promote information sharing on the role of ICTs in combating climate change.

How can global standards contribute to increasing the sustainability of ICT?

Touré: In general the process of standardization has an enormous contribution to make in terms of sustainability. Standards reduce technical barriers and promote compatibility between systems, avoid costly market battles over preferred technologies, and reduce costs. They aid developing countries in building their infrastructure and encouraging economic development. Globalisation requires global standards, and a global standards body like ITU clearly has a major role to play.

One outcome of the Kyoto and London symposia was the establishment of a Focus Group, open to all, to develop internationally agreed standard methodologies to measure the impact of ICTs on climate change, both in direct and indirect terms. By developing a consistent basis for the assessment of greenhouse gas emissions from ICTs, manufacturers, operators and users can work systematically to contain and to reduce their effect on the climate.

The Focus Group held its first meeting in September 2008, with some people attending 'virtually' by means of electronic working methods. It will additionally identify areas where standards, protocols and methodologies can be developed that will help to achieve a reduction in greenhouse gas emissions. It will complete its work in early 2009.

New developments in technology can help. Next generation networks are a major focus of our new standards, and ITU recently published a Technology Watch report showing potential energy savings from deployment of next generation networks compared to traditional public switched telephone networks of as much as 40 per cent.

These savings are achieved by adopting higher standards for energy efficiency of ICT devices both in use and in standby mode, plus tolerance by networks of a wider range of temperatures and humidity, which will reduce the need for heating and cooling.

Better use of power-saving modes for ICT equipment, e.g. PCs, mobile and laptops can reduce emissions and this is another important area of our work. For example our new broadband standard VDSL-2 has three power modes.

With the introduction of digital modulation for broadcasting a saving of almost 10 times is made over power consumption by radio broadcasting equipment. Again ITU's work is instrumental in this switch-over with the ITU Regional Radiocommunication Conference 2006 having been responsible for the Regional Plan for 120 countries' switchover from analogue to digital transmission.

The vast majority of the existing standards, protocols and methodologies were developed at a time when the improvement of energy efficiency and the reduction of the emissions of greenhouse gases were not given a sufficiently high priority. In the light of the urgency for action on greenhouse-gas emissions, these are being reviewed according to an energy impact checklist developed by our experts. The same list is used to check that all new standards conform to energy saving requirements.

Which policy-setting instruments are required in ICT to advance environmental sustainability?

Touré: We need to be sure that policy can also have a positive effect on economic growth. The development of ICTs for the mitigation of climate change is clearly a growth area, as countries commit to reducing their carbon footprint. It therefore has to be seen as an opportunity and that should be the basis for any policy instruments put in place.

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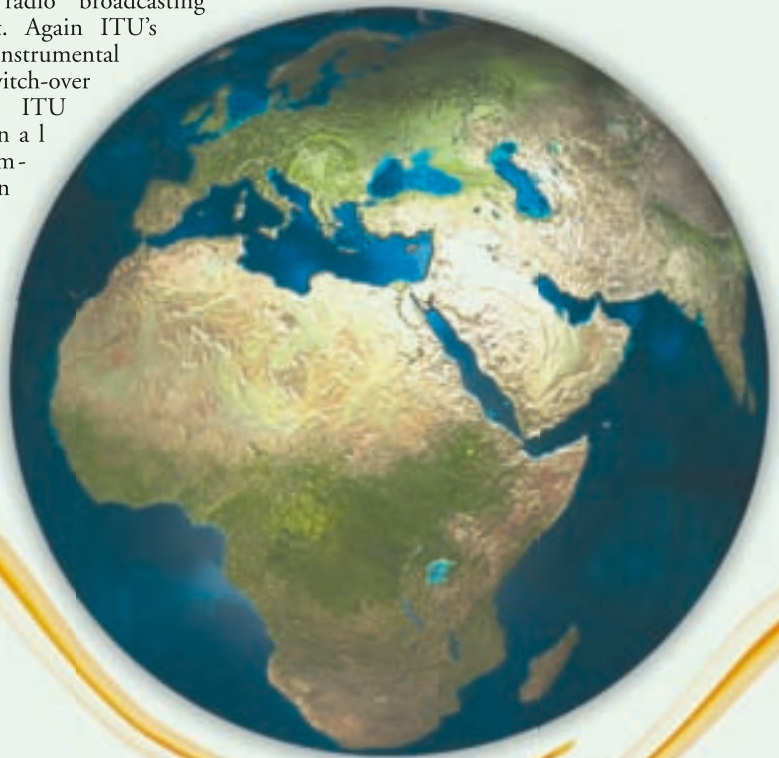
At the ITU, a number of Resolutions and Recommendations have been recently adopted by the membership to focus our work on climate change and to emphasize the importance of collective approaches to this issue.

For example, at the recent World Tele-communication Standardization Assembly in South Africa, the ITU membership adopted a major Resolution on climate change. It recognizes that ICTs can make a substantial contribution and be a major factor to mitigate the effects of climate change, for example through energy-efficient devices, applications and networks. It resolves that climate change is a high priority in ITU as part of our contribution to the UN processes and global efforts to moderate climate change.

In support of these standardization efforts policies must be implemented in a coordinated and standardized way globally. Without global application these instruments are irrelevant. They must be applied in a global context.

More generally, ICT policymakers must raise awareness at all levels of the key role that ICTs can play in moderating climate change as part of global and national strategies.

The positive role of ICTs should be recognized more in global discussions on climate change. ITU is taking an active role to bring this message to the ongoing negotiations towards a new global agreement on climate change. ITU is working closely with its partners in the UN system as well as other agencies to deliver as one and provide comprehensive solutions to climate change.

What is your personal vision of a sustainable future and ICT's role in it?

Touré: At ITU Telecom Africa in 2008 we were able to report unpredicted and unprecedented growth of mobile telecommunications, with millions of people obtaining a phone for the first time. We have now reached four billion users at the end of 2008. We need to maintain the expansion of services, which are so valuable to emerging economies, but we need to do so without increasing the carbon footprint per capita. We need to set and to achieve targets for increased energy efficiency.

I strongly believe that ICTs have a key role to play in sustainability. The knowledge society has at its heart the amazing developments in ICTs of the past decade. We are learning to better harness this knowledge and create global solutions.

Close to my heart are the concerns of developing countries. Poorer countries generate a tiny proportion of greenhouse gases yet frequently bear the brunt of problems related to climate change. I welcome the international efforts such as those undertaken under the UN umbrella to fully embrace this issue. Clearly ICTs are playing a strong role here.

The trickle-down effect of this international effort will be a reduction – over time – in the effects of climate change and that applies to developing as much as it does to developed countries.

We are now beginning to understand how to use ICTs to achieve mitigation of climate change. We must strive to reduce global greenhouse-gas emissions. With 191 governments and over 700 private sector members in its membership, ITU has a unique ability to bring all stakeholders together to help achieve these aims on a global scale. We strongly believe that these are achievable goals, and that an industry that has given birth to the most positive and powerful global revolution of the last century can also be called on to help usher in a new era of corporate responsibility.

ITU itself is committed to achieving climate-neutral status within three years, for instance by bringing its work closer to our membership rather than expecting the membership to travel to Geneva, by using webcasts to broadcast events, and by making all ITU-T Recommendations and other key documents available online free of charge. Making the ITU-T Recommendations available online was estimated to save 105 tonnes of CO_2 annually, in both paper and its distribution.

We see a future where we can reduce our carbon footprint by reducing travel, using more energy efficient devices, finding alternative energy sources and yet still keep productivity high. And this will not be possible without the application of ICT. ICT is in fact less a part of the problem but more an important part of the solution. And in the face of the global financial crisis it is all the more important to understand the positive impact that the application of ICTs can have on global markets.

CELTIC N • E • W • S
Telecommunication Solutions

CONTENT

EDITORIAL

Dear reader,

The year 2009 started, as earlier year, with two major events at Celtic: the start of the next call for project proposals (Call 7) and the annual Celtic Event, which took place from 10 to 12 March in Paris.

In this issue I will provide a summary on both aspects in the following article.

Another important news are the Celtic Awards in gold, silver, and bronze, which were given to the three most successful projects TIGER, MOVIES, and CARLINK, which finished in 2008.

Finally, we give two very interesting Celtic projects the floor to present their work results and expected impact on future business and innovations. These projects are GENESIS and HD-VIPER.

I hope you enjoy reading this issue of the Celtic News, and I invite you to send me comments and suggestions for future issues.

Heinz Brüggemann
Director Celtic Office

Celtic Call 7

Improved process for better projects

The new 7th Celtic call for proposals has been running from 10 March 2009, and the submission deadline for proposal outlines is 18th May 2009.

Based on the experiences from former calls we have modified and significantly simplified the PO phase of the proposal process. The PO phase for proposal outlines will now only require a very brief description of the project idea, focusing mainly on the expected business impact, the innovation, and the expected results. The PO will no longer be reviewed by the group of experts but by the Celtic core group, who will give for each proposal a "GO" or "NO-GO" decision. This approach reduces significantly the work load for preparing a proposal and full description will now only be needed for the full project proposal (FPP) at the second call phase. This should also help to prepare proposals both for FP7 Call 4 and Celtic Call 7 without to heavy requirements on resources.

Complementarity between Celtic Calls and FP 7 Calls

For the coming FP7 calls, a large number of thoroughly prepared proposals are expected because of the substantial budget of this call. It is therefore obvious and understandable that most researchers will mainly focus on the IST Call and will use much of their resources to prepare a solid and well-defined project proposal. Experiences from the former framework programmes show that the success rates of proposals to be accepted and funded have been rather low. The majority of the work invested in the preparation of failed proposals must be considered as lost, if the proposal was only submitted to that particular IST call. Because of the heavy competition, it is obvious that many of the failed proposals would still be of very good and profound quality, and it would be a pity if those proposals could not be started at all.

To assure that a proposal may have a second possibility to be launched, even if not as an FP7 project, it is advisable to submit a project proposal to FP7 but, in parallel, also a proposal outline to Celtic. As such a proposal outline would not require too much additional effort, this strategy could considerably increase the chances of a proposal. By following this approach the requirements for a two-phase call phase in Celtic can be fulfilled. The project may then still decide to prepare a full proposal for the second phase in case the FP7 call failed and provided the proposal outline received a good review and was invited to submit a full proposal.

Further aspects for consideration if a proposal should be prepared as FP7 or Celtic proposals should be the duration and industrial focus of a project. Especially shorter-term (i.e. between 2 to 3 years), more pre-product development oriented as well as more bottom-up defined projects could be a better target for Celtic than for FP7.

In any case the recommended strategy of preparing the best proposals should be to keep a close focus on assuring the best possible and broadest coverage of work items that are defined in the Strategic Research Agendas of the related technology platforms (NEM, eMobility, NESSI and ISI) and in the Celtic work programme. This could best be done by considering both FP7 and Celtic project calls.

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

Expected research items in Call 7

As for all previous calls, call 7 proposals shall focus on the technology issues described in the latest version of the Celtic Purple Book (Version 2008-2009), which is covering the following main areas:

- Towards Future Internet
- The new telecommunications scenario
- The new scenario for media and content
- Challenges of mobility
- Ubiquitous services, connectivity and networks
- Service Elements Framework
- Understanding the business landscape
- The satellite component
- Development of the Pan European Laboratory

It is also possible to consider research topics of the Strategic Research Agendas (SRA) from the following European Technology Platforms:

- NEM (Networked and Electronic Media Technology Platform)
- eMobility (Mobile and Wireless Communications Technology Platform)
- NESSI (Networked European Software and Services Initiative)
- ISI (Intergral Satcom Initiative)

The detailed descriptions of Purple Book and SRAs are accessible through the Celtic web site (*www.celtic-initaitive.org*).

Future directions in telecommunications and ICT

4th Celtic Event in Paris

Celtic held its fourth annual Event in Paris from 11 to 12 March 2009. Similar to previous years, over 200 high-level people from industry, politics, and research attended the event. The main objective of the event was to present the current status, results and developments of the ongoing Celtic projects

Keynotes on innovation

The Celtic Event was opened by Christophe Ravier from the DGCIS, which is providing the public funding from France. In his talk Mr Ravier stressed that the support for Celtic will continue to remain high, as the French ministry is still very much focusing on national and international initiatives on market-driven reserach, involving in particular small and medium-sized enterprises.

In another keynote speech Olivier Coste, Management Committee Secretary at Alcatel-Lucent, presented his views on the future of the Internet. The rapid evolution of the current Internet is increasingly approaching the limits of the current networks. Very soon, the Internet will have to serve an estimated 5 billion users, including around 50 billion machines sharing high traffic volumes over increasingly complex networks. The network, Mr Coste said, must become an intelligent partner serving seamless connectivity, autonomic networks, agile Mobility Management, security, fraud, privacy, trust features, eco-innovation and battery life issue. The Future Internet may be built on four pillars: Internet by and from people, Internet of content and knowledge, Internet of things, and Internet of services.

José Jimenez, chairman of Celtic

Thierry Bonhomme, Director of R&D, Orange-FT, gave a very interesting overview on the strategic relevance of Open Innovations. He pointed out that the ICT ecosystem is changing significantly: Boundaries are blurring across the value chain, there is a faster innovation in products and services, and by the emergence of global players. Orange has launched an Open Innovation Initiative consisting of a Orange Partner Program to develop the use of Orange's "Dream Orange Program", Innovation-TV and Interacting with user's; Orange Start-up program (invest in start-ups); partnerships with universities; and cooperative projects like the European Framework programs including EUREKA clusters, and French regional clusters.

His speech was followed by a talk of Christophe Diot, Chief Scientist, Thomson, France, on Thomson's vision of the Future Internet. According to him it will be the Internet of content and emotions to carry emotions, to provide access transparency, and an easy content selection. Thomson's three strategic research programs are on Home Networking (Home

Gateway at the center of the media experience); Workflow & content access (Automated metadata data insertion and Simplify content manipulation, search, access); 3D & content coding (3D technology (TV, mobile, virtual), High quality audio/video and adaptation to various devices and networks).

After these technical keynote presentations the current EUREKA chairman, Manuel Nunes da Ponte, provided an overview on the Portuguese Chairmanship of EUREKA. Priorities include particularly to focus on increasing EUREKA's public visibility in regard to achieved results and impacts and also on including more countries outside Europe into the EUREKA framework programme.

Panel discussion

At the panel discussion, chaired by David Kennedy, Eurescom, high-level experts form public administration, EU Commission, Spanish ministry, and telecommunications industry discussed the needed technical innovations for the coming year,

which the extended Celtic cluster should cover in the coming years to sustain the European leadership in telecommunications. For the Spanish authorities there will be a priority in 2009 on future of Internet and digital content. Celtic will remain an important instrument and an extension of Celtic-Plus is indeed required.

As Jaoa da Silva from the EU Commission pointed out, the Celtic workprogramme, but also the EU programmes, lack from their ability to clearly demonstrate the impact tat was really achieved by these programmes. The discussion turned around the question which focus will become important for Celtic-Plus including the complementation of coming EU initiatives on the Future Internet. Celt-

ic-Plus may, however, not loose its main advantage of building a strong community among European companies, on being very close to the market needs and allowing, through its bottom-up approach a fast reply on immediate requirements from the industry. What has been missing in the current Celtic workprogramme was

a mechanism to better assure future implementation of results and the provision of platform also beyond the life of projects. Panlab was seen as a potentially interesting tool to provide testing means via federated labs and platforms. The input from the discussion and the expressed new ideas will help top construct a new programme which answers better to the coming needs.

Exhibition

In the parallel exhibition, 18 Celtic projects presented their results. Among many very interesting projects some highlights were the demos of 100GET on new and cost-efficient high-speed optical networks that can deliver between 40 to 200 Gb/s over Ethernet based protocols. These solutions are desperately needed to make the requirements of the future Internet happen. Another interesting demos, only to mention a few of them were shown by the project Carlink, showing inter-car communication solutions to prevent and reduce accidents, BOSS, focusing on providing public safety against attacks e.g. at public transportation. HDVIPER provided a very interesting new service opportunity for high-definition video conference systems over IP networks. Also several more telecommunication operations oriented projects, like TRAMMS (providing immediate traffic analysis), TIGER on new emulation platform allowing to test implementations and compare different Ethernet solutions competing for the Metro Ethernet market.

One external project, which is very much related to many Celtic projects, was the demo provided at the Panlab booth. The Panlab concept, which was originally developed by Celtic, was taken further and is now closer to real implementation. Panlab, as a federated network of test labs, is seen as very important cornerstone for the development and enrolment of the future Internet.

Further information about the Celtic event is available on the Celtic website at *www.celtic-initiative.org/Events/ Celtic-Event09-Paris/welcome.asp*

Celtic Excellence Awards 2008

Three most successful projects honoured during Celtic Event

After the assessment of the closed projects in 2008 the Celtic Core Group has decided to give the 2008 Celtic Excellence Award to the following projects:

Celtic Excellence Award in Gold:

TIGER (Together IP, GMPLS and Ethernet Reconsidered)

The TIGER results on carrier-grade Ethernet technologies have significant scientific, standard and business importance and impact. These technologies are gaining importance and are expected to play a major role for the design of the Future Internet. The results are expected to help the involved companies to better focus their strategies on this important market segment – the worldwide revenue for business Ethernet services is expected to reach $31 billion by 2012. Furthermore the project had direct impact on several product lines and contributed to the world-wide standardization.
www.celtic-initiative.org/Projects/TIGER

Celtic Excellence Award in Silver:

MOVIES (Mobile Video and Interactive Services)

MOVIES has focused on Mobile TV, which is probably one of the next hot topics for both mobile network operators, broadcast operators and content owners. The project .achieved significant technical

innovation in the field of integration of DVB-H mobile broadcasting with return channels through the mobile network. MOVIES provided new interactive mobile services by combining mobile cellular and digital broadcast communication technologies. The project focused especially on the co-operation between DVB-H and wireless networks (UMTS/ GPRS, WiMax).
www.celtic-initiative.org/Projects/MOVIES

Santiago Cáceres (left) from ETRA, Spain, receives the Bronze Award for CARLINK from Celtic chairman José Jimenez (middle) and Celtic Office director Heinz Brüggemann

Celtic Excellence Award in Bronze:

CARLINK (Wireless Traffic Service Platform for Linking Cars)

CARLINK developed an intelligent wireless traffic service platform which improves traffic safety, reduces traffic accidents and provides new types of vehicular services. The project provides uniform and specified solutions for a tailored, hierarchical vehicular communication network for a variety of different end users from simple end devices to integrated vehicle communication centers. The commercial impact of the Carlink platform can boost a variety of new businesses and jobs in the near future.
www.celtic-initiative.org/Projects/ CARLINK

The Awards were handed over to the project coordinators during the Celtic Event on 12 March 2009.

GENESIS

Deployment of Next Generation Services

Telecommunications operators are under extreme pressure from flat or declining revenues in their traditional services. To address these challenges, they must cut costs radically, and/or invest heavily in new technology or deploy additional value-added services.

GENESIS architecture

In order to develop and deploy advanced services to corporate users, GENESIS uses the NGN/IMS as a reference. GENESIS has built a global business service, which includes an application and service deployment framework.

Mark Roddy; LAKE Communications
mark.roddy@lakecommunications.com
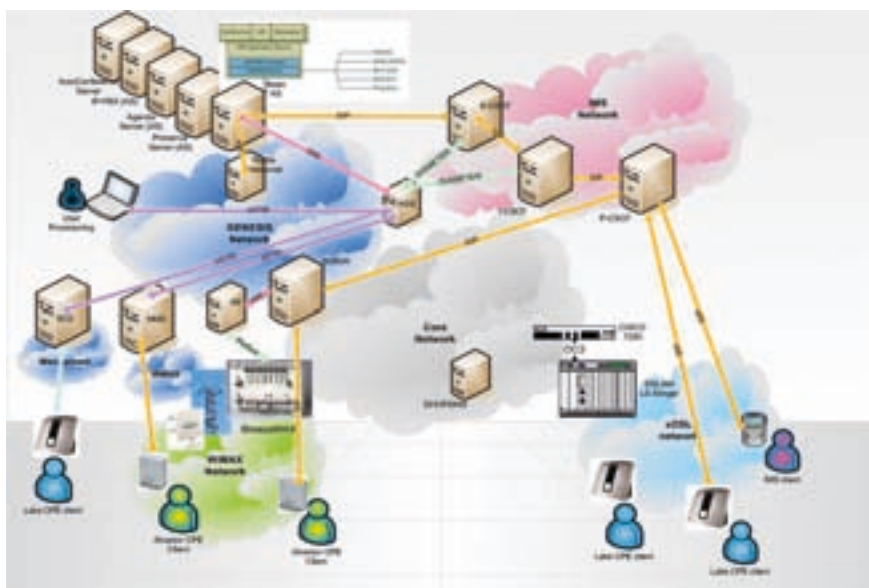
GENESIS architecture

The GENESIS project has built a prototype platform that is capable of serving and deploying advanced and integrated voice services over IP (VoIP) and value-added business services for enterprises. The platform has been deployed on an NGN/IMS core network and the customers access all provided services from wired and wireless access networks using NGN xDSL and WiMAX customer premises equipment (CPE).

The figure describes the full GENESIS architecture with three layers: The Access Networks, including xDSL and WiMAX networks, Core Network and Application Layer. Deployments of advanced services are only possible with CPEs compatible with the NGN that use standards such as SIP or Web Services. The platform allows the rapid creation, deployment and testing of new advanced services. The deployed architecture can integrate and manage new services like session control, call management, presence or any other advanced services related to NGN.

A typical example of an advanced service developed in Genesis is a presence-aware AutoConference, which allows users to schedule conferences with other users so that conferences are launched automatically from the network, based on user presence. The service includes a Web based agenda GUI (graphical user interface), which allows the user to select whether the conference should start at a given time or when all participants are available. The user's presence information is collected by the service from a standard IMS presence service. In addition, the services include standard HTTP/REST interfaces for third-party integration. This feature provides access to the services from external applications, including Facebook applications, also developed in the project.

Testbed and demonstrator

The testbed makes possible rigorous, transparent and replicable testing of communication technologies.

The main objective of this testbed is to allow a smooth transition to the real user testbed located in the rural area of Aragón, Spain. To achieve this, the testbed is composed of several parts; one for each access network and another for the core network, with the GENESIS platform overlaid.

A real scenario demonstrator, with real users, has been deployed to evaluate the GENESIS platform. This network infrastructure, deployed on a WiMAX and xDSL scenario, can be divided also into three main parts:

- Access Network composed of BaseStations and CPEs
- Backbone Network – WiMAX network used to connect the BaseStations
- Exchange Nodes to connect the demonstrator to the laboratory test bed and the core and application layers.

Conclusion

The GENESIS project has developed an integrated telecommunications system capable of offering innovative services on a next-generation broadband access network to real users. It demonstrates how VoIP communications services can be offered to users, corporations and SMEs on an advanced infrastructure under a common NGN/IMS. As a future work Genesis has planned to add mobility enablers on top of the service and deployment platform providing ubiquity and convergence of users.

Further information is available on the project Web page at *www.celtic-initiative. org/Projects/GENESIS*

HDVIPER

High Definition Videoconferencing over IP Environment

The HDVIPER project focuses on designing an open and scalable HD video conferencing platform, called Snake. This platform is based on the Service Oriented Architecture (SOA) that will allow users to access HD video conferencing services.

The goal for HDVIPER is to provide basic video conferencing services, such as media plane and control plane services, and extra services, such as network and presence services. These services are designed accordingly to the SOA paradigm and can be easily accessed through defined and unified Web Services interfaces, thus creating a fully open HD video conference platform. The session control mechanism for establishing video conferences is based on the Session Initiation Protocol (SIP), a widely extended protocol in many Voice over IP solutions.

Approach

Nowadays, video conferencing services are becoming more and more popular thanks to the improvement of IP networks and broadband access to the Internet. Network needs (in terms of bandwidth, delay and jitter) required to perform HD video conferences are high and strict, but the "best effort" paradigm applied in Internet (currently used for most of the current SD video conferencing solutions) is not good enough to assure the Quality of Service (QoS) needed by HD system. Therefore, one of the main issues for the HDVIPER project was to create those services needed to provide the high quality HD video conferencing system, attractive for both end users and operators.

Innovative aspect

As stated earlier, the Snake platform is completely based on software and the SOA paradigm. Thanks to this, a variety of different services can be easily

Jesús Alcober
Fundació I2CAT; jesus.alcober@i2cat.net

Francesc Mateu
Androme; fmateu@androme.es

Piotr Pawalowski
Pozna Supercomputing and Networking Center
astagor@man.poznan.pl

deployed and offered to the end user. In the scope of the project, the use of an Enterprise Service Bus (ESB) helped to create an open platform where the network reservation services and the presence agent service were deployed and made them fully independent, so they can be accessed without knowledge of their underlying implementation.

At the present time, there is no commercial or pre-commercial solution providing this kind of video conference services, including both the middle-ware and the network layer. Moreover, since the platform is open, third-party service providers could offer extra services within the same platform.

Achievements and future steps
At this point of the project, we had been able to confirm the benefits provided for such an open HD video conference platform as the one aimed by the project. Several commercial softphones could establish conferences in various HD and SD resolutions, and moreover they can be easily integrated with the presence and bandwidth reservation services. The major
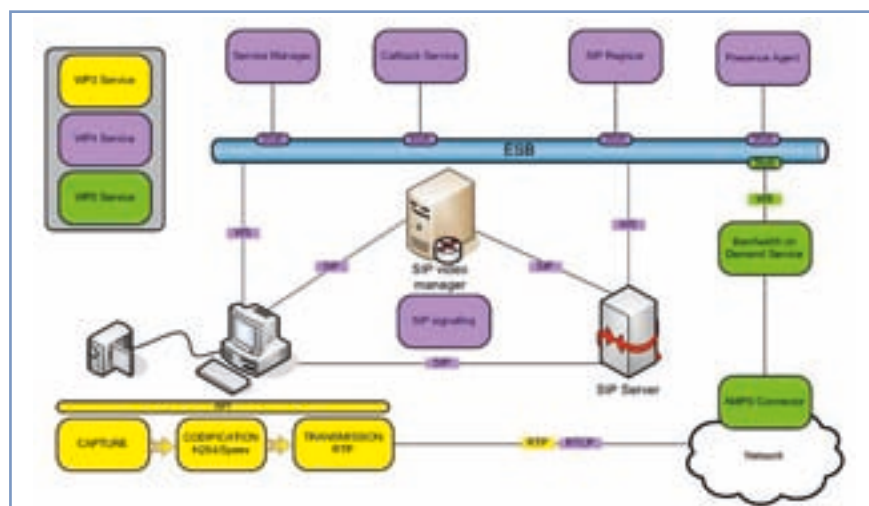
HDVIPER platform

incompatibility found was the difference in the implementation of video codecs used by every manufacturer, especially for the H264 codec which has been chosen as the best solution for most usage scenarios.

We will concentrate our next efforts to complete development of the framework and interoperability tests in different scenarios, such as eHealth in and outside hospitals, eLearning, business and residential scenarios.

Consortium members
The HDVIPER consortium is formed by the following companies: Alcatel-Lucent España (Spain), Androme Ibérica (Spain), Alkit Communications (Sweden), Border-light (Sweden), Fundació I2CAT (Spain), Karolinska Institutet (Sweden), Poznan Supercomputing and Networking Center (Poland), Royal Institute of Technology-KTH (Sweden), and Telefónica I+D (Spain).

More information about HDVIPER can be found at *www.hdviper.org.*

About Celtic
Celtic is a Eureka cluster, 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..

A manufacturer's view on sustainable ICT

Ulrich Barth
Alcatel-Lucent
Ulrich.Barth
@alcatel-lucent.de

Global warming and other environmental issues have brought sustainability high up on the political and socio-economic agenda. Thus, sustainability is also an important topic for the ICT industry. As a leading manufacturer of ICT equipment Alcatel-Lucent is committed to doing its part in tackling global environmental challenges by driving an eco-sustainable communications transformation that will yield tangible business benefits.

The company's holistic eco-sustainability programme focuses on designing and deploying intelligent, environmentally responsible access, transport and core networks, with a structured framework based on innovation at multiple levels.

In addition to its cutting-edge technology, Alcatel–Lucent helps businesses and consumers reduce greenhouse gas emissions through carbon-reducing communication applications and professional services to assess, upgrade and manage multi-vendor service provider networks to maximum efficiency. The company also has developed and implemented corporate strategies and practices to reduce the environmental impact of its own operations.

Sustainability covers several areas

Alcatel-Lucent is delivering eco-sustainable products and services in five areas:

1. Delivering energy efficient products at all layers of the telecommunications network.
2. Delivering alternate energy-sourced products and services (e.g. solar and wind-powered product offerings).
3. Optimizing network engineering, design and other services to help customers grow networks with the least eco-impact.
4. Offering comprehensive end-of-product-life solutions that extend the life of their investments and provide product takeback and recycling services.
5. Enabling other industries and individuals to reduce their carbon footprint through smart grids, smart energy metering, building management, telecommuting and other means.

Developing energy-efficient equipment

Alcatel-Lucent has taken on research activities targeted at developing power-efficient technologies for telecommunications equipment. This research will enable communications hardware to operate more efficiently as well as enable applications that can have an even larger impact on reducing greenhouse-gas emissions. On the equipment side, engineers are conducting research in areas that reduce the power required to transmit information over wires, fibres and through the air. For example, in the mobile communication area, research is currently underway on new amplifier designs, remote radio heads and intelligent antenna arrays. New network architectures that can reduce the overall demand for power while providing increased network functionality are also being explored. For example, arrays of femto base stations combined with a few macro base stations can be significantly more energy-efficient than networks based on solely one or the other technology. Additionally, increased use of photonics in components is resulting in decreased heat generation.

Alcatel-Lucent Bell Labs is conducting research to identify new techniques to improve thermal management performance while reducing the energy required to cool equipment. Innovative materials and components are being developed, including thermal interface materials to conduct heat, vapour chambers to spread heat, and heat sinks to dissipate heat into the air stream. Advanced manufacturing technologies are being exploited to control material properties on the micro and nano-scale to enhance thermal contacts and optimize air flow patterns.

International collaboration for sustainability

Through its participation in the European research cooperation framework, Alcatel-Lucent is a key partner in ADDRESS, an Integrating Project under EU Framework Programme 7 (FP7). The project is co-coordinated by Enel Distribuzione and includes 24 other partners from the energy sector, the industrial and domestic electricity technology and ICT market, universities and European research institutes. ADDRESS aims at developing the best technical and economic solution for enabling "active demand", this means enabling consumers to proactively interact with the power system market by means of real-time interaction based on price and volume signals and by promoting the exploitation of sources of renewable energy and the development of a distributed generation model.

Alcatel-Lucent Bell Labs has been preparing specific project proposals in the context of FP7 Calls 4 and 5. One of the major Integrating Project proposals under preparation and managed by Alcatel-Lucent deals with "Green Networking." The main focus is mobile cellular networks and their evolution. The overall goal of the project proposal is to address the global environmental challenge by providing more functionality and performance at lower energy consumption. Cost-effective mechanisms will be achieved to drastically reduce energy waste and improve the energy efficiency of existing and future communication systems, without compromising the users' perceived quality of service and system capacity.
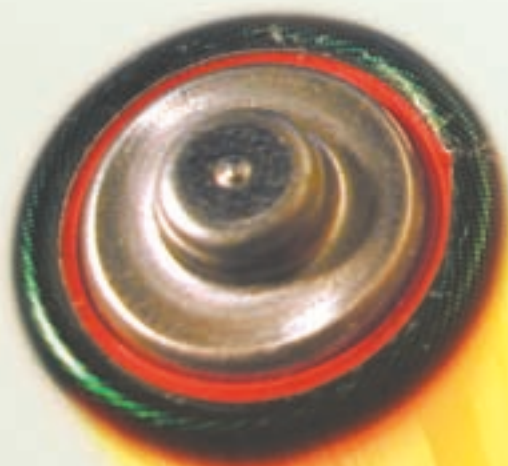
FTTH in Europe – A delayed take-off

Adam Kapovits
Eurescom
kapovits@eurescom.eu

For years now, fibre to the home (FTTH) seemed to be around the corner in Europe. Everybody agrees that fibre is the most future-proof access solution and that Europe needs to step up its activities in this regard, in order not to be left behind. The question is, what is happening now, in the middle of the financial crisis, and what is the outlook for Europe?

It might be debated whether Europe is second or third among the world's leading economic regions regarding fibre penetration, but it is definitely far from being the first. Asia has pulled ahead considerably in this regard, leaving North America and Europe behind.

Regulators seem to be aware of the issue, at least on the verbal commitment level, but so far the regulatory framework did not prove very helpful to overcome the difficulties and to provide sufficient incentives.

Challenges

There are many challenges for any FTTH roll-out in Europe: high initial investment costs and a very long timeframe for return of investment; achieving critical mass and economies of scale; segmented markets; a competitive broadband market, fast developing alternative technologies; and a restricted financial environment.

What fibre offers

There are a number of positive points of fibre, including being the most future proof, supporting symmetrical high bandwidth, and low operational costs. Continuous advancement of technology is lowering the installation cost, but this installation cost is still very high. Nevertheless, in most circumstances fibre is already competitive in greenfield installations, if careful planning is applied. (See Eurescom study P1651 FANGS, *www.eurescom.eu/Public/Projects/P1600-series/P1651/*).

What is missing?

Probably the biggest question is whether the market is really ready. Do European citizens demand fibre? To the author it seems that this is not the case. The North American FTTH experience, for example, indicates typical download and upload bandwidths similar or only moderately exceeding those that are commonplace in Europe over DSL. Even the advocates of fibre admit that apart from the case of multiple users' parallel usage of some very high-end entertainment services, other access technologies also fit and can support the mainstream service mix. As a Finnish official has put it, in the broadband market the supply is much bigger than the demand.

What could motivate investment?

Currently, the main driver of bandwidth hunger is entertainment, more specifically video. Is high-definition video as a single major driver sufficient? Probably not. There is a lingering doubt whether triple play and/or quadruple play will underwrite the cost of FTTH, and this prevents many operators from wholeheartedly committing to fibre.

And here comes the aspect of economic troubles. There is a consensus that high-speed Internet is an enabler of ICT-innovation, digital content, growth, education, new jobs and social welfare. Or, as the U.S. Congress put it in its memo on stimulus plans in January 2009: "For every dollar invested in broadband, the economy sees a tenfold return on that investment."

Many European governments, in particular in Scandinavia, consider financial support to the broadband infrastructure to stimulate the economy, either directly, or in the form of guarantees and funds to help financing such an undertaking by bridging the initial debt period.

An important aspect from the investment point of view is the regulatory framework. Europe shows considerable diversity in this respect. There seems to be a major split between North and South. In northern Europe, municipalities are involved in the fibre-based broadband infrastructure on the basis that it provides a competitive advantage to their constituency. Thus, service-based competition is favoured in which competing service providers use the same network. In contrast, infrastructure-based competition is favoured in southern Europe. In any case, national regulators in Europe have realised that a stable framework is needed; the rules should be laid out in advance, and guarantees need to be given to investors that those rules will not change.

Conclusions

Although many large-scale deployment plans in Europe are running behind schedule, nevertheless the FTTH Council Europe is moderately optimistic that finally FTTH is taking off in Europe. Indeed, the overall picture has changed from a year ago, and there seems to be a lot more happening. It will be interesting to see what improvements the coming year will bring in Europe with regard to FTTH.

The future of home networking

First OMEGA Open Event in Rennes

Milon Gupta
Eurescom
gupta@eurescom.eu

From 5 to 6 February 2009, European research project OMEGA held its first Open Event on home networking in Rennes, France. About 80 home networking experts from Europe and Japan participated in the event, which presented the state-of-the-art on home networking technologies and OMEGA's technological concepts. The event focused on OMEGA's four main topical areas: Radio Power Line Communication (PLC), Wireless Optics, and Inter-Mac.

The Open Event consisted of two parts: a training seminar on the first day, and a workshop on the second day. In the training seminar on the first day, senior experts from the OMEGA project held tutorials on three key areas of home networking.

Prof. Ruediger Kays from the University of Dortmund gave a lecture on "Wireless Home Networking based on Radio Technologies". He first explained the context of converging networks, devices and services and then gave an overview on the radio technologies relevant in current and future home networking scenarios.

In the second tutorial, Marie Le Bot from Orange Labs presented the state of the art in Power Line Communications (PLC). She explained the role of PLC within the OMEGA concept, whereby PLC is meant to function as an in-home backbone with an expected data rate of 1 Gbps. She particularly focused on how a PLC access network could be designed

OMEGA's technical manager, Martial Bellec from Orange Labs (middle).

Professor Dominic O'Brien from the University of Oxford.

Josef Faller from Homefibre

Hiroshi Sakai from AS Business Partners

OMEGA coordinator Jean-Philippe Javaudin from Orange Labs

Keynote speakers Josef Faller and Hiroshi Sakai

and how the challenge of electromagnetic compatibility has been tackled by various initiatives.

Professor Dominic O'Brien from the University of Oxford explained in his tutorial the characteristics and challenges of optical wireless. He particularly explored the benefits and challenges of line-of-sight (LOS) technologies in the home network context.

The workshop on the second day started with a joint keynote presentation by Hiroshi Sakai from AS Business Partners and Josef Faller from Homefibre. Mr Sakai gave an overview on the home networking situation in Japan. Fibre to the Home (FTTH) is already quite strong in Japan: the number of FTTH users is above 11 million, and the growth rate of FTTH has exceeded that of ADSL already in 2006. Digital TV broadcasting in Japan started in 2003 and the cable TV market is going strong with more than 25 million subscribers. Mr Sakai continued to explain the different service areas in home networking, which cover entertainment, learning and business applications as well as life support services.

Mr Faller in his part of the keynote strongly advocated Polymer Optical Fibre (POF). According to Mr Faller, POF has significant advantages for the home network applications over other physical media, and is particularly attractive in case rewiring of a house becomes necessary.

The following presentations from the OMEGA project covered the four main topics: radio, Power Line Communication (PLC), Wireless Optics, and Inter-Mac, going deeper into the technical issues already discussed in the seminar on the previous day. It was stated that a first demonstration of OMEGA technologies is scheduled at end of 2009.

Overall, the event showed the high interest and the rapid pace of technological advance in home networking and particularly the high relevance of OMEGA's concept for the future of home networking in Europe.

Further information on the event is available at
www.ict-omega.eu/events/
open-event-2009.html

Internet Reloaded
Trilogy workshop in London

Adam Kapovits
Eurescom
kapovits@eurescom.eu

On 2nd March 2009, European research project Trilogy organised a one-day interactive workshop with the title "Internet Reloaded" in London. The purpose of the high-level, invitation-only event was to evaluate the impact of upcoming changes to the fabric of the Internet from a business perspective.

Influential researchers have started to make subtle but fundamental changes to the underlying protocols of the Internet, the very foundation of the global ICT industry, with the aim to fix the root-cause of cross-industry problems.

Panel discussion (from left): Paul Strong, eBay; James Enck, mCapital; Kevin Hinde, BBC; William Webb, Ofcom; Rainer Zimmermann, European Commission

The aim of the workshop was to assess the impact of such changes, and how different players could exploit those changes, and ultimately, whether the Internet will become significantly better for its end-users.

Searching for answers to those questions, the interactive workshop brought together those driving Internet technology and industry leaders whose businesses revolve around the Internet creating a unique mix of individuals with considerable power

Dr. Bob Briscoe, BT

Matt Bross, CEO of BT Innovate and
BT Group Chief Technology Officer

over the future competitive landscape of the industry.

The workshop started with a session on visions of the Future Internet. Matt Bross, CEO BT Innovate and BT Group Chief Technology Officer, gave the opening keynote in this session. He highlighted how much everyday life and businesses rely on the Internet today, and how vulnerable the Internet is, and then discussed the importance and potential of innovation. A second keynote was delivered by the renowned technology entrepreneur Ohad Finkelstein, partner and head of International Investments at Venrock Israel, who addressed technology and innovation during financial meltdowns.

This was followed by a session focusing on new technologies that help to intensify choice. In this session Dr. Hossein Moiin gave a talk on personal broadband collat-

ing vision and reality. The second talk in this session was given by professor Mark Handley, who presented the idea of spreading sessions across Internet service providers using multipath TCP (Transmission Control Protocol).

Then came the key part of the day – the participants split into smaller groups to discuss the two key ideas presented Dr. Moiin and professor Handley.
The workshop continued after lunch with a short feedback from the breakout sessions and with two keynotes, this time from Eric Klinker, CEO of BitTorrent Inc, and Dr. Bob Briscoe from BT. Eric Klinker presented BitTorrent's new approach to content delivery and congestion control. Dr. Bob Briscoe focused on tackling congestion in a more intelligent way than simply throttling heavy usage, by using explicit congestion notifications (ECN) and re-inserted feedback.

After these two technical presentations the audience again split up into smaller groups and discussed the ideas from a business perspective. The workshop concluded with a panel discussion on how the ideas presented can help in shaping the future of the Internet and what should be the next steps for researchers. The panel discussion was chaired by Rainer Zimmermann from the European Commission. The participants were William Webb from Ofcom, Kevin Hinde from the BBC, James Enck from mCapital, and Paul Strong from eBay, who contributed to a partly controversial discussion on the way forward to the Future Internet.

Further information on the workshop and on Trilogy in general is available at *www.trilogy-project.org*

Autonomic computing and networking – Eurescom study P1856

Bruno Dillenseger
Orange Labs
bruno.dillenseger
@orange-ftgroup.com

Thierry Coupaye
Orange Labs
thierry.coupaye
@orange-ftgroup.com

The manual management of pervasive and highly distributed large-scale networking environments has become in practice almost impossible, due to their complexity. In the area of computing, IBM promotes the concept of autonomic computing to overcome many manageability problems. The Eurescom study P1856 on Autonomic Computing and Networking extends the original autonomic computing vision to also cover the management of the emerging complexities in the network of the future. Autonomics is pivotal in the "Internet of the Future".

Scope of autonomics

The aim of autonomic computing and networking is to automate the management of network and service infrastructures in order to enhance dependability and security, to adapt performance in response to varying workloads and to decrease human interventions. Autonomic networks and systems typically exhibit the so called self-properties. In large scale telecommunications environments the most important are self-optimization, self-configuration, self-protection and self-repair. The emergence of self-managed network and service infrastructures appear inevitable by looking at the exploding complexity of these infrastructures and their associated operation costs. However, autonomics is a disruptive technology that may impact significantly the telecommunications business.

A possible definition

The study contends that introducing autonomic capabilities leads to a system that is able to self-govern its behaviour within the constraints of the specified business goals that it seeks to achieve. Autonomics include the use of information and semantics to capture context and knowledge relating to network capabilities, environmental constraints and business goals expressed by policies. Knowledge embedded within system models is used by policy-based network management systems that employ policy enforcement processes to automatically configure network elements in response to changing business goals or other environmental constraints. This realizes an autonomic control loop in which the system senses changes in itself and its environment, analyses this information to ensure that business goals and objectives are being met, computes a reaction plan should these goals and objectives be threatened, and, closing the loop, reconfigures itself.

Major drivers

From a strategic point of view the following major driving forces relevant to telecommunications have been identified:

- The full vision of autonomics is very attractive but ambitious. Its maturity and deployment will take years.
- The target application domain in telecommunications is very large, and covers most areas in the network, platform as well as services and applications layer.
- The autonomic technology is disruptive compared to current telecommunication infrastructures and practices.
- The building blocks of autonomic technology are numerous and complex.

In this context and by looking at the actors in the field, the major risk for telecom operators is the deployment of solutions based only on off-the-shelf products. In such cases the solution would barely be integrated and adapted to the individual needs of the operators. Hence, every operator will have to examine the roadmap for a smooth adoption of the technology in order to preserve its operational excellence and know-how as well as protect its assets and overall competitiveness.

Recommendations

Considering the major drivers the following recommendations can be given to telecom operators willing to adopt autonomic technologies:

- Progressive adoption: Define specific use cases to acquire expertise and start with specific autonomic features in specific contexts and then leverage expertise and hopefully technological elements for use in other contexts. Start with services and middleware and then with networks, because the evolution of IT infrastructures is easier than the evolution of networks.
- Position telcos as integrators of autonomic technologies rather than producers of technology. Focus on end-to-end integration architectures: blueprints, architectural frameworks, APIs, reusable infrastructure elements and standards.
- In the long run, standards could make a difference in preserving the position of telecom operators, but standards usually come late.

Conclusion

As a conclusion, telecom operators can focus on removing the roadblocks to adoption of autonomics in three areas. The first area covers the introduction of autonomic features for end-to-end service scenarios, such as management of QoS in IP networks for VoIP, IPTV and other IP services, encompassing the different network segments (fixed, mobile, core) including home and service platforms in data centres. The second area covers the introduction of autonomic features in disaster recovery scenarios, for example self-configuring, self-organizing networks and systems after major environmental disasters and hazards, with a focus on the interdependencies between critical infrastructures, typically between the power grid and ICT networks. The third area is cloud computing, which includes the possibilities of self-managing virtual infrastructures, in order to optimise utilisation rates of servers and other physical infrastructures, such as storage and cooling systems as well as mechanisms self-configure and self-optimise properties governed by service level agreements.

Interconnection challenges of IP telephony – Eurescom study P1853

Mohamed Boucadair
Orange Labs
Mohamed.boucadair
@orange-ftgroup.com

IP telephony service offerings are on the rise. Recently several such offers emerged, addressing both residential and corporate customers. As a result of this development the ratio of the overall IP telephony traffic compared to PSTN (Public Switched Telephone Network) is changing rapidly, and in some countries the volume of VoIP traffic has become significant, if not dominant, already.

In France, for example, the VoIP traffic in December 2008 amounted to 51.2 percent of all voice traffic. One of the critical challenges IP telephony is facing now is to become a real multi-domain end-to-end communications. Therefore IP telephony service providers are working to extend the scope of their service offerings beyond the boundaries of their administrative domains. One way of doing this is to deploy several Points of Presence (PoP) around the world. A more realistic approach is to settle interconnection agreements with other service providers to ensure IP-based telephony services beyond the scope of a single administrative domain and provide global reachability.

In addition to these challenges, IP telephony service offerings should meet other requirements such as QoS (Quality of Service), high availability and robustness. These requirements are not only valid for the service layer but also for the network/transport layer which are not necessarily managed and controlled end-to-end by the same administrative entity. For these reasons, new means to drive the inter-domain routing selection process should be investigated and implemented to ensure the delivery of QoS-enabled telephony services across several IP telephony domains.

In the current traditional telecom industry, interconnection is often based on bilateral agreements, two parties agreeing to transfer traffic to each other for termination, (possibly) with an exchange of money based on the terminations performed. Wherever a small number of similarly sized operators exist, this type of agreement serves all parties well. Nevertheless, the current bilateral model is not always valid, for several reasons.

First, due to the emergence of new VoIP actors, a large amount of interconnection agreements should be settled in order to reach destinations managed by these new actors. The required agreements are drastically increasing and may be close to current BGP domains (i.e. 30,000). This scalability problem is a weakness for the centralised model if adopted by a service provider wishing to place calls with all telephony destinations and without using PSTN or other PLMN (Public Land Mobile Network). Second, unlike PSTN, customers are not anymore identified only by an E.164 identifier. New telephony identifiers have been promoted within IETF. These identifiers are commonly known as URIs (Uniform Resource Identifier) and are similar to DNS (Domain Name System) aliases. Consequently, no geographical localisation is conveyed in such schemes, which in turn has an impact on the telephony routing process.

For these reasons, alternative interconnection models should be investigated and promoted, particularly the cascaded model which reduces the amount of required SIAs (Supplementary Information A). In this mode, each service provider establishes a limited set of SIAs. SIA peers are immediate physical neighbours. Only one to one SIAs are established. Owing to these SIAs, telephony prefixes of the immediate neighbour and the ones reachable through its ITAD (IP Telephony Administrative Domain) are offered to any SIA peers.

Conclusion

The current work conducted by the IETF (Internet Engineering Task Force) assumes a federation-based model for enforcing interconnection between VoIP domains. This model covers only the case where a limited number of ITADs are involved and assumes that a central point is introduced to store or to maintain the ITAD prefixes owing to an ENUM (E.164 to Telephone Number Mapping) architecture. Communications are placed between two originating and terminating domains. The federation-based model does not scale since it assumes that a full mesh of links is deployed. Furthermore, the current SPEERMINT architecture does not cover the interconnection between two federations. In the context of delivery of universal services, a large number ITADs should be involved and therefore interconnected. A centralised model is not suitable. From this standpoint, dynamic and flexible means to interconnect ITADs and exchange their managed prefixes should be encouraged. Service providers should carefully evaluate the flexibility allowed when adhering to a given interconnection model.

Eurescom study P1853 proposes an alternative to enforce IP telephony interconnection in a dynamic scheme. In particular, the study recommends the adoption of the same interconnection model for various services relying on lookup function (e.g. IP telephony, IM, presence, video), activating dynamic means to exchange telephony routing information and promoting interconnection practices which are agnostic to the used signalling and media protocol.
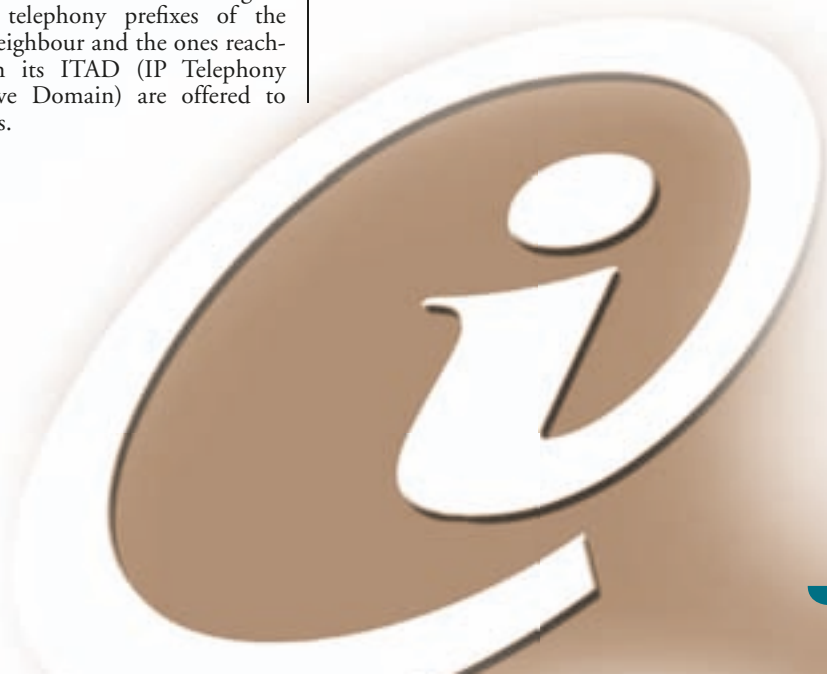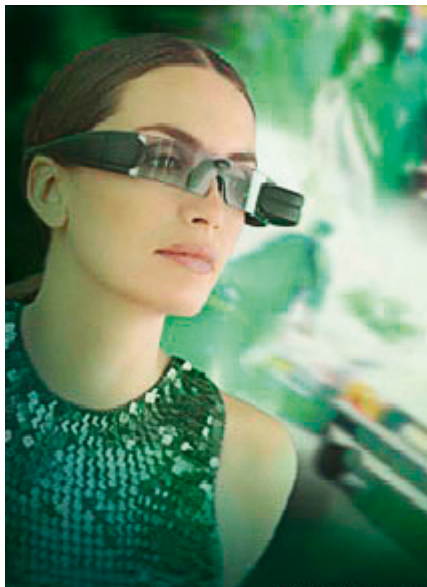
3D Internet
Technologies and challenges

Luis M. Correia
IST – Technical University
of Lisbon, Portugal
luis.correia@lx.it.pt

This article discusses the concept of 3D Internet, addressing not only the interface perspective, i.e., how the user can visualise it, but also, how the 3D Internet can be produced and how the network will impact on it.

The concept

The concept of 3D Internet has recently come into the spotlight in the R&D arena, catching the attention of many people, and leading to a lot of discussions. Basically, one can look into this matter from a few different perspectives: visualisation and representation of information, and creation and transportation of information, among others. All of them still constitute research challenges, as no products or services are yet available or foreseen for the near future. Nevertheless, one can try to envisage the directions that can be taken towards achieving this goal.

Visualisation and interfaces

A very first approach to 3D Internet is, obviously, related to the problem of visualisation and interfacing. One can think, a priori, of a couple of devices that can accomplish such a goal: PETs (Personal Enhanced Terminals, usually known as Mobile Phones) and PARTSs (Personal Augmented Reality Three-dimensional Spectacles). PETs are capable of creating a kind of holographic image, hence, enabling the visualisation of 3D images and videos; an artist's impression can be viewed in the right figure, which is based on a well-known phone. PARTSs constitute an advanced version of today's multimedia glasses, making it possible to visualise 3D images and even mixing them with real images (see left photo).

Quite a number of possibilities and technologies for this kind of devices have been discussed for some time, and one can foresee that, somewhere in the near future, prototypes will become available. Still, there are a number of issues that require to be addressed besides the simple visualisation of objects, like the possibility of the user to choose the angle of view, or even to go "into" the object, but, above all, on how to represent such objects and transport this information in an efficient way.

Information creation

Another perspective into 3D Internet can be taken from the production of 3D images and videos. Taking the well-known ways to do this (e.g. using various cameras located in different positions) as a starting point, one can extend this view to a much broader approach. Many, especially young people are nowadays prepared to put their own life in the Internet e.g. by uploading pictures and videos to popular websites. This concept can be extended further: people witnessing an event can make a video of this event by using a mobile phone and send it in real time via a mobile or wireless network to a website hosting a 3D-construction programme. This programme takes the images taken from different locations and creates a 3D video, which is made available in real time on the Internet.

This approach puts together quite a number of different technologies, ranging from location information of users producing the several 2D contributions, to synchronisation of contributions at the host programme, besides the creation of such a programme itself. Furthermore, this puts also a number of requirements on the networks used to transport information, e.g. concerning delay, Quality of Service, efficient delivery, caching, and distribution.

Conclusions

One can easily foresee that the 3D Internet will constitute a revolution in information visualisation, representation, transportation, and delivery. The technologies mentioned above enable a myriad of novel services and applications. The implications are hard to quantify, given their extent, since a new world will be open to people and products.

+++ News in brief +++ News in brief +++

First prototype of robot scientist

Scientists in the UK have incorporated artificial intelligence (AI) and a sophisticated set of algorithms into a robot, named Adam, that can develop hypotheses and carry out a whole scientific experimentation cycle. The research, published in the journal Science, paves the way for dramatically increasing the rate of scientific progress.

According to the study, led by Professor Ross King at Aberystwyth University in the UK, robot scientists have the potential to provide more than simple automation to systems biology. By originating hypotheses, devising experiments, physically carrying them out and continuously interpreting the results, they could revolutionise the way scientific research is carried out. Advances in AI and computational systems are making this possible.

The scientists developed a robotic system and set it the task of identifying the genes that encode enzymes which catalyse reactions in baker's yeast – scientists use this organism to model more complex life systems. This 50-year-old puzzle had not yet been solved, and the researchers were interested to see how the robot would tackle it. Adam came up with and tested 20 hypotheses, and produced conclusions based on its experiments. The researchers then confirmed the results by repeating the experiments manually.

Their next robot, Eve, will have much more brain power and will be put to work searching for new medicines. Professor King hopes the application of intelligent robotic thinking to the process of sifting tens of thousands of compounds for potential new drugs will be particularly valuable in the hunt for treatments for neglected tropical diseases like malaria.
www.aber.ac.uk/compsci/Research/bio/ robotsci

ITU Report: digital divide remains despite ICT growth

According to the latest report by the International Telecommunications Union (ITU) on the ICT Development Index, the global digital divide has remained unchanged despite significant ICT growth in developing and developed countries between 2002 and 2007.


Global ICT Developments
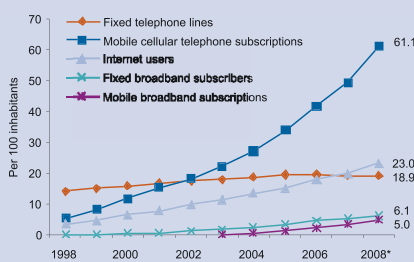
Note: *Estimates; Source: ITU World Telemommunication/ICT Indicators database
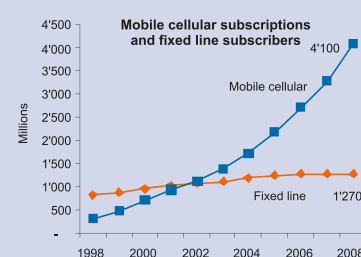
The most advanced countries in ICT are from Northern Europe, with the exception of South Korea. Sweden tops the new ITU ICT Development Index, followed by South Korea, Denmark, the Netherlands, Iceland, and Norway.

Poor countries, in particular the least developed countries, remain at the lower end of the index with limited access to ICT infrastructure, including fixed and mobile telephony, Internet and broadband.
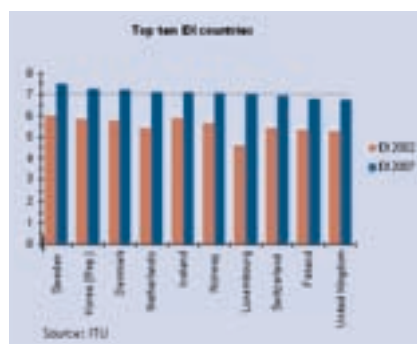
The report finds that all countries, except Myanmar, have improved their ICT levels between 2002 and 2007, but some much more than others. Eastern Europe not only features high relative growth but also one of the highest IDI value gains and can thus be considered as the most dynamic region on ICT developments during this time period.

On a global level, most progress has been made on ICT access, which includes fixed and mobile telephony, Internet bandwidth, and households with computers and Internet. One of the main drivers of ICT growth globally and particularly in developing countries has been mobile telephony. Six in 10 people around the world now have mobile phone subscriptions. By 2007, there were an estimated 4.1 billion subscriptions globally, compared with about 1 billion in 2002.

In terms of ICT use, which includes the number of Internet users, fixed and mobile broadband, progress has been much slower. In particular broadband still has to take off in many countries.

Some developing countries have moved up considerably in the index over the five-year period, including Pakistan, Saudi Arabia, China and Vietnam. This is partly due to high mobile phone growth, coupled with an increase in Internet users. China, for example, moved up from 90 in 2002 to rank 73 in 2007 through significant progress in increasing the number of fixed telephone lines and mobile subscriptions as well as fixed broadband.
www.itu.int/ITU-D/ict/publications/ idi/2009

EU ministers: research investments are key to growth

Ondrej Liska, Czech Minister of Education, Youth and Sports

The EU ministers responsible for economy and innovation confirmed their commitment to investment in research and innovation at the Competitiveness Council meeting in Brussels, Belgium, on 5 and 6 March 2009.

In their recommendation they agreed: "Higher, more effective and efficient investments in education, research and innovation are a key factor for the sustainable long-term growth of a competitive European economy and should remain a high priority, also in the context of the current global economic downturn."

In the recommendation, the Council, chaired by Czech minister Ondrej Liska, also highlighted the importance of reaching the goal of investing 3 percent of gross domestic product (GDP) in research and development (R&D), and called on Member States to encourage the private sector to invest more in research.

Concerning research infrastructures, the ministers call for negotiations on the proposed legal framework for European research infrastructures to be completed "as soon as possible".
www.consilium.europa.eu register.consilium.europa.eu/pdf/en/09/st07/ st07232.en09.pdf

Obama's BlackBerry
Constraints of an Internet president

Milon Gupta
Eurescom
gupta@eurescom.eu

Barack Obama is widely regarded as the world's first "Internet president". His success in the US presidential election was based to a large extent on the ingenious use of the Internet for mobilising supporters and voters. He himself sent and read e-mails on his BlackBerrry day and night during his campaign. The device has almost always been fastened to his belt. It was, thus, tragically ironic, when soon after Obama's biggest triumph some security-concerned aides openly speculated in mid-November 2008 that the president-elect might have to part from his beloved BlackBerry.

They certainly had a point: first, there is the Presidential Records Act of 1978, which makes all written White House communications public property subject to examination under the Freedom of Information Act five years after the end of a presidential administration.

In addition, there are also security concerns. The president's digital communication would be a primary target for hackers all over the world. Apart from leaking confidential information, there would also be the risk that assassins could find out the location of the presidential BlackBerry.

For all these good reasons, no president before him used e-mail. George W. Bush used a BlackBerry during his 2000 presidential campaign – like his contender Al Gore. Upon taking office, Bush gave up his BlackBerry, as well as the use of any e-mail software. But Obama is different. "Obama is the first president who is addicted to the BlackBerry like the rest of us," former Clinton press secretary Joe Lockhart commented.

Consequently, Obama fought for his right to e-mail. Or, in his own words: "In just the first few weeks, I've had to engage in some of the toughest diplomacy of my life. And that was just to keep my BlackBerry."

Obama was able to persuade his security staff to let him keep using a BlackBerry. Two days after the inauguration in January, on 22 January 2009, White House spokesman Robert Gibbs announced at a press conference that a compromise had been reached allowing Obama to keep in touch with a select group of staff and friends through the device "in a way that use will be limited and that the security is enhanced to ensure his ability to communicate, but to do so effectively and to do so in a way that is protected."

Part of the compromise involved the president giving up his old e-mail address and switching to a new, secret one. "I won the fight but I don't think it's up and running yet," Obama said.

Obviously, the White House security experts and the Canadian BlackBerry producer Research in Motion Ltd. were still working on the added security features of Obama's BlackBerry. It was not clear, whether Obama's personal BlackBerry had been upgraded, or if he had gotten an entirely new device.

During the presidential campaign and transition period, Obama used a Verizon Wireless BlackBerry. In photos, it appeared to be an 8700, commonly issued to corporate staffers and which comes without the camera or full-sized headphone jack found on more consumer-oriented models.

Whether old or new BlackBerry, one week after the press conference, Obama seemed to have received his new old companion. US media reported that on 29 January the president walked along the West Wing Colonnade toward the Oval Office, while looking down at the electronic communicating device he held in both hands.

While the president was having his stroll with his electronic companion, an international armada of hackers was probably already on the hunt for cracking the security of the allegedly spy-proof device. According to Kevin Mitnick, a famous hacker and now security consultant, it is not impossible to hack the presidential BlackBerry. "It's a long shot, but it's possible. You'd probably need to be pretty sophisticated, but there's people out there who are," Mitnick said.

According to Mitnick, the hackers would most likely target a person with access to Obama, as their network would be less secure than the President's. Once the hacker got hold of Obama's mail ID, it would be easier to lure him into a Web site that had previously been breached in order to transfer malicious code.
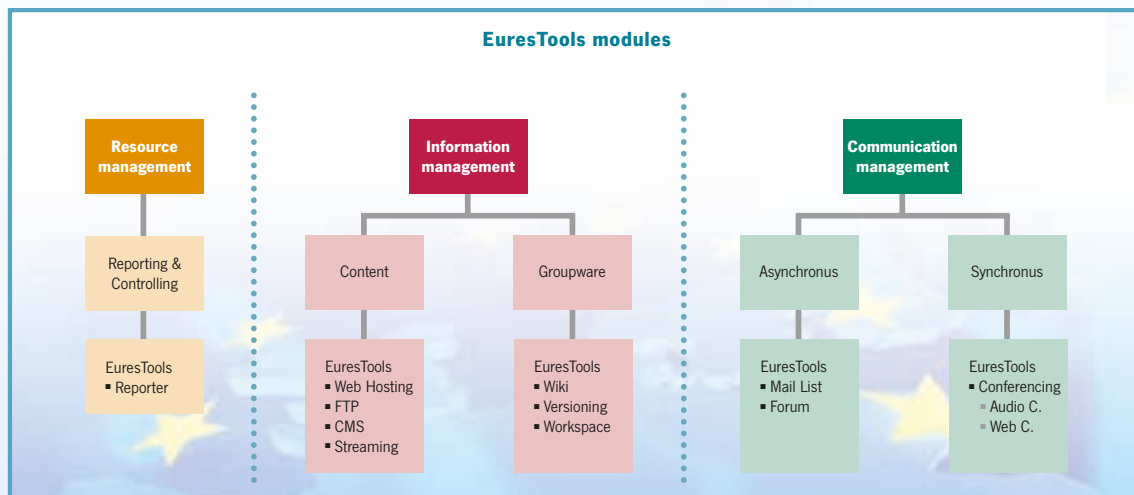

Time will tell, if Mitnick's prediction is right. Irrespective of that the story of Obama's BlackBerry may be more than just a trivial anecdote about the addiction of a presidential Internet-Junkie. It appears like a symbol of the change in communication policy that Obama promised to introduce in the White House. The text above the contact form of the whitehouse.gov website says that "President Obama is committed to creating the most open and accessible administration in American history".

As Obama himself has mentioned himself, he is wary about entering the "bubble" enveloping a president in the White House. The BlackBerry may be his means to stay in touch with the world beyond the presidential bubble.

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in Telecommunications GmbH
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69123 Heidelberg, Germany
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