EURESCOM mess@ge
Issue 1/2002

ACCESS NETWORKS
HIGHWAYS TO ADVANCED SERVICES

EVENTS
OSA and PARLAY workshop

IN FOCUS
Elisa Communications

EUROPEAN ISSUES
Next Generation Networks Initiative

WORKSHOP

Service programming in Next Generation Networks: Is SIP the solution?

EURESCOM workshop, 5-6 June 2002
Venue: EURESCOM, Heidelberg, Germany
www.eurescom.de/ngn-workshop

Have you heard about Next Generation Networks (NGN), but you're not sure how they will look like? Are you interested in the programming and creation of services in Next Generation Networks? Then this workshop is right for you.

The objective of the workshop is to present and discuss how next generation service platforms can provide advanced services. It will show the benefits that can be gained from using the SIP protocol and programmable SIP Application Server, e.g. in terms of ease of use, flexibility and programmability.

SIP (Session Initiation Protocol) is considered by many Telco insiders to be the ultimate protocol for Next Generation Networks, which will ensure product interoperability, flexible and fast service development.

Topical highlights include:
- Why NGNs? Are NGNs programmable?
- Can NGNs solve the problems of Intelligent Networks?
- Which NGN solutions are ready to use?
- Are NGNs interoperable?
- Are NGNs cost effective?
- How can NGN services be developed?
- Is an Application Server just a new Service Control Point (SCP)?
- When should a network operator start deploying NGN services and solutions?
- Who are the new service developers in the open market place?

Speakers include:
- Tom McGuire, Director of Service Creation, Pelago
- Carlo A. Licciardi, Project Leader EURESCOM project P1109 'NGN services', Telecom Italia Lab
- Chanh Phung, Director of Product Marketing and Management, IP Unity
- Michael Gardner, Deputy Head of the Customer Behaviour Laboratory, BTexact Research

Demos and exhibitions
In an exhibition area, the industry and EURESCOM projects addressing NGN service aspects will show demos and exhibit NGN service platform products and related components.

Who should attend?
NGN architecture and standardisation experts, service and application developers, service providers, equipment and software vendors, everybody interested in the opportunities arising from NGN.

Registration and further information:
www.eurescom.de/ngn-workshop
Registration deadline: 17 May 2002

Workshop fee:

Regular	€ 200,-
EURESCOM members	€ 150,-
Presentation speakers	free

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e-commerce-based service and network management

EURESCOM workshop, 12-13 June 2002
Venue: Heidelberg, Germany

The objective of the EURESCOM workshop on "e-commerce-based service and network management" is to identify and discuss the telecommunications industry tendencies to use off-the-shelve e-commerce platforms for service and network management.

Topical highlights include:
- Impact of e-commerce methods and technologies on operations support systems
- Impact on business and process models and relationships with the actors involved
- New e-commerce frameworks for service and network management
- Implications on provisioning processes and service level agreements

Who will be there?
- Operations support systems experts
- E-commerce experts
- Experts from vendors

Who should attend?
- Operations support systems architects
- Systems planning experts
- Systems developers
- Technical and product managers

Demonstrations
Demonstrations and exhibitions will accompany the workshop. In particular vendor-related demonstrations of e-commerce-based service and network management solutions will be presented.

Registration and further information:
http://www.eurescom.de/public/Events

Workshop fee:

Regular	€ 200,-
EURESCOM members	€ 150,-
Presentation speakers	free

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PROGRESS IN EUROPE

Dr. Claudio Carrelli
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Something is happening in Europe. The most obvious indication of this is the introduction of the euro, a single currency for twelve European countries. What is not so obvious for most people: there is also something happening in European research policy.

Currently, preparations for the European Union's 6th Framework Programme for Research and Technological Development are on their way. This doesn't appear to be very revolutionary, but in fact it is. The 6th Framework Programme sets new, ambitious targets in the EU's efforts to increase Europe's innovative power and economic competitiveness, and it proposes new instruments to achieve this goal.

Among the seven thematic priorities, Information Society Technologies (IST) play a dominant role. From the total of about €13.3bn more than a quarter – €3.6bn – is to be invested in Information Society Technologies. This reflects the increased importance of information technologies for all European citizens, both in economic and in social terms. We tend to forget that in some European countries 8 out of 10 citizens don't have Internet access, which increasingly means exclusion from knowledge and social participation. Giving people access to advanced means of communication is a topic of crucial impact in democratic societies.

Only publicly funded research can ensure that innovative technologies cover the needs of all groups in society including social groups that are in danger to be excluded, like disabled or elderly people.

We have a strong interest in a Europe that strengthens its position in international research and innovation

Apart from the shift in priorities, what is really revolutionary is the change of paradigm in the way the EU plans to organise research work in the 6th Framework Programme. The key word is integration. With the introduction of the so-called Integrated Projects, the European Commission has adopted a new approach in its research policy, aiming at getting EU's R&D efforts more targeted towards achieving a critical mass.

EURESCOM has intensified its traditionally good relations to the EU's IST programme

But the integration goes beyond that. In the 6th Framework Programme also national research programmes and prospective member countries from Eastern Europe will be integrated.

For a collaborative organisation like EURESCOM that has been at the forefront of integration in R&D for more than ten years, this new approach is very convincing and has our full support. As a practical consequence of this, EURESCOM has intensified its traditionally good relations to the EU's IST programme. In November last year, EURESCOM joined IST's 'Next Generation Network Initiative' (NGNi), which has made good progress in the last months.

It seems a bit paradox that EURESCOM has recently widened its scope of interest towards telecom companies from other continents, in parallel to intensified involvement in EU research activities. But there is no real contradiction in that. EURESCOM will stay an organisation whose heart beats in Europe. We have a strong interest in a Europe that strengthens its position in international research and innovation. However, limiting collaboration in R&D to Europe doesn't make sense in a global economy, especially in a border-transcending business like telecommunications.

Europe comes first, but collaboration with the rest of the world is beneficial for everyone. It is in this sense that we at EURESCOM are glad to be part of the progress in European R&D.

EDITORIAL REMARK

Dear readers,
Nearly a quarter of the year has already passed, and a lot of activities have been going on. This is especially true, if you look at what is happening on EU level. Read about the latest developments in the EU's promising Next Generation Network Initiative (NGNi) under 'European issues'. Another exciting EU activity will be the Integrated Projects under the 6th Framework Programme. Read our exclusive report about the position of ETNO's working group on R&D towards Integrated Projects.

As usual, we offer a lot of innovative insights from EURESCOM's R&D projects. This time we have focussed on Access Networks. A lot of improvements occurred in this area, which are worth to be brought to a larger audience. At first glance many of the technologies described here seem to be abstract and far away from the user. But if you look closer, you see how relevant they are for end-user services and hence for the telecommunications business. This observation also applies to the field of OSA and Parlay, which offers completely new service opportunities. How hot this topic is, was proven by the fact that the EURESCOM workshop on the same topic was joined by a large number of leading experts and high-level specialists from Europe, America and Asia. See the report under 'Events'.

When it comes to reaching for the stars, the Americans with their star spangled banner appear to be predestined to take the lead. Now they seriously try to expand the Internet to deep space. More about it in our column 'A bit beyond'.

You will find this article and all the other contributions plus some extra information on our Web site at www.eurescom.de/message. There you will also find an opportunity for immediate feedback, if you would like to send us comments or suggestions. Your opinion is important for us, so we would like to encourage you to send us your feedback. This will help us in our continuous effort to improve this magazine and make it indispensable reading for anyone interested in collaborative R&D in telecommunications.

We look forward to hearing from you.

Your mess@ge editorial team
message@eurescom.de

SN@PSHOT

Talk, shave and brush all in one
The new killer application:
3F triple functionality mobile phone.

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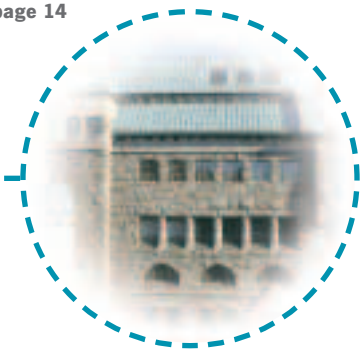

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ETNO WORKING GROUP
ON R&D DISCUSSED INTEGRATED PROJECTS WITH EURESCOM

On 13 December 2001 ETNO's working group on R&D met at EURESCOM in Heidelberg. Key topic for discussion was the so-called Integrated Projects, one of the main instruments of the European Community's 6th Framework Programme for Research and Technological Development 2002-2006.

Currently, the European Commission runs several thousand single projects, for example in its IST programme. With the intended Integrated Projects the European Commission aims at identifying major themes around which a number of related sub-projects will be organised. An Integrated Project might thus be in the range of several tens of millions of euro, which in terms of manpower could mean 1,000 to 10,000 man-months partly funded by the EC.

The members of the ETNO working group considered the proposed Integrated Projects an important instrument for making the EC R&D programmes more targeted and efficient and for improving their overall quality.

Crucial for the success of these large Integrated Projects will be efficient and effective management procedures and tools supporting collaborative work. Acknowledging that EURESCOM has developed time-proven management methods for comprehensive collaborative research management, the members of the ETNO working group considered EURESCOM to be in a good position to apply for the management of selected Integrated Projects from 2003 onwards. Moreover, the EURESCOM team in Heidelberg was regarded as being perfectly capable of orchestrating the programme definition, supervising projects throughout their execution and ensuring delivery of high quality results.

NEWS FROM THE WORKING GROUP ON THE
FUTURE OF EURESCOM

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In December 2001 the EURESCOM General Assembly asked me to chair a continuation of the working group, which would determine a detailed business model for the future of EURESCOM. Naturally, I was prepared to take this task as France Télécom place a high value on the work and results achieved in EURESCOM projects, and we are very interested in a successful re-launch of EURESCOM as a powerful tool for collaborative research.

19 people, representing many of the current shareholders and some non-shareholder organisations, attended the first meeting in Paris on the 17th January 2002. The guests that attended were Vodafone, and ex-shareholders Telia, Telefónica and Tele Danmark. All participants are interested in having an operator driven platform for collaborative research in the telecommunications domain. Our ambition is to generate a new business model for EURESCOM that satisfies the requirements of our current shareholders and is attractive enough to bring in new participants.

The meeting reached significant agreements about the areas for operator-focused collaborative research, which were well summarised by Ulrich Dietz from Vodafone when he stressed that "the telecommunication domain needs desperately a sort of harmonisation in all fields that operators aren't competing in". Some of those domains for co-operation are protocols, interfaces, payment mechanisms, interoperability testing, etc., and to some extent business patterns/models.

There was universal agreement that a significant business goal of EURESCOM in the future would be to sell its highly professional know-how on conducting collaborative R&D, especially by securing management roles in European Community projects and particularly in the Integrated Projects under the 6th Framework Programme. It is expected that this could grow to be a significant part of the activities of EURESCOM by 2004.

A draft business plan was produced based on the results of the first meeting, which was discussed at the second meeting of the working group on 12 February in our France Télécom premises in Paris. The discussion mainly clarified the details of the plan and confirmed the principles underlying the new model. Some items were identified that needed more information and detail, and the EURESCOM office was tasked to produce these answers in time to allow the current shareholders to preliminarily decide on the new model by early March.

A third meeting of the working group is scheduled for the 22nd March in Heidelberg, where the companies interested in progressing with EURESCOM will discuss how to handle the transition from the old business model of the last ten years to the new model, which should be fully implemented for 2004.

Once we have the structure sorted out, we can progress with the collaborative initiatives, which will make a significant contribution towards creating profitable innovative services that users will appreciate.

EASY ACCESS TO USER SURVEY RESULTS

EUROPEAN ICT MARKET DATA NOW AVAILABLE IN A USER-FRIENDLY DATABASE

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Imagine you are having dinner in a nice restaurant. Just as you are starting to eat your excellent meal, suddenly electronic noise comes from the neighbour table. It is the ring-tone of a mobile phone. An equally noisy conversation by the person with the mobile phone follows. The enjoyable moment is spoilt.

How many people would you think dislike situations like that and feel disturbed by mobile phones? If you think their number is close to 100 percent you are wrong. The percentage is much lower, as a comprehensive ICT user survey by EURESCOM shows: It is about 45 percent for non-users and only 25 percent for heavy mobile phone users. (see figure 1)

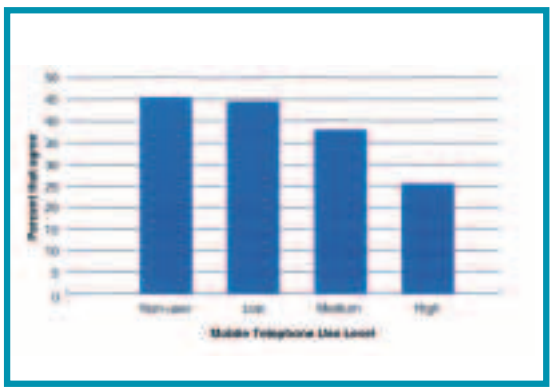

Figure 1: Mobile Telephone Disturbance Level

The EURESCOM ICT user survey

Last year, EURESCOM concluded a large cross-national user survey, which was performed in 9 European countries. Users from more than 9,000 households were interviewed in comprehensive face-to-face interviews about their personal and professional situation and about their usage patterns and attitudes on mobile phones and Internet. A huge statistical database in SPSS format was created, which contains a plethora of information on user attitudes towards modern Information and Communication Technology (ICT) and their behaviour concerning the related services. (see figure 2)

Easy access via Memphis Explorer

Size and complexity of the original database prevented its widespread use. Only experts with a good knowledge in social sciences and in database handling were able to work with the original database. Because of the enormous interest in the results, we looked for a user-friendly way to make its content also available to non-specialists. We did not want to print hundreds of preset analysis charts into an inflexible document. Instead we found a method to make the data available in a very easy-to-access but still flexible way by using the Memphis Explorer software package. Its unique interface has been designed for managers and executives with little or no statistical or computing knowledge. Yet the programme contains all the features they need to examine any relationship within the data.

Queries can be focussed on many different categories of information. Some examples are shown in the following list:

- **Demographics:** Age, sex, household size, profession, employment sector, education and income
- **ICT equipment:** Possession of 19 types of information communication technology equipment, along with access to the Internet
- **Activities:** Participation in 15 groups of leisure activities, involving the media, culture, religion, socialising, etc., along with issues related to stress
- **Social networks:** Types of social contact, means of contact and distance to contacts, with distinctions among family, friends, acquaintances and neighbours
- **Internet use:** Computer, Internet and mobile telephone use, the user's expertise and features selected, besides clarification of what the Internet is used for, according to 40 varied criteria
- **Attitudes and values:** Values and attitudes toward 12 issues related to the Internet and 17 issues related to the mobile phone
- **Future services:** Foreseen future use of information and communication technologies.

The Memphis Explorer in action

Joint venture with Gallup

For marketing and selling the ICT survey database, EURESCOM set up a joint venture with Gallup Iceland. A demo of the product, along with information on other issues such as the research content, the methodology, the price and the delivery can be found on the product Web site at http://eurescom.img.is/. Further information can be received by sending an e-mail to eurescom@img.is.

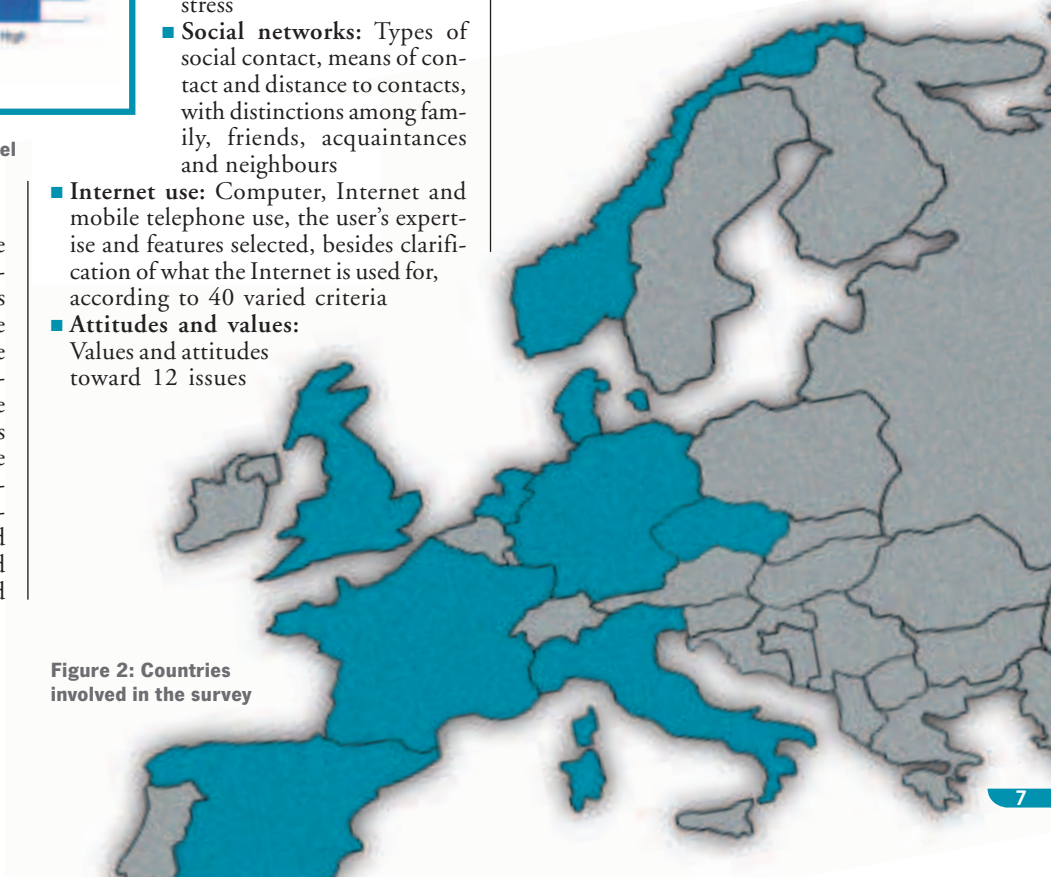

Figure 2: Countries involved in the survey

ACCESS NETWORKS

HOW TO DRIVE UP TO THE INFORMATION SUPERHIGHWAYS

In the last few months and years we have been overwhelmed with announcements of ever thicker bit pipes in the backbone networks. We have started measuring backbone bandwidth in Terabits/sec. Sometimes we wonder how the information society can ever succeed to fill these bit pipes. We can safely answer: "More multimedia content". Telecommunications operators do welcome the recent advances in digital photo and video equipment as these give the users the means to produce more data. And with the production comes the need to transmit the content and share it with family and friends, sometimes across the globe.

But have you recently tried to upload the content of a 4 mega-pixel digital camera to a Web site via your ISDN modem? If you tried, you know about the problem. The issue becomes even more challenging when you are mobile and try to use the mobile data service for doing the same thing. Even with GPRS this is a lengthy and expensive adventure today.

Recently, Erkki Liikanen, EU commissioner for the Information Society, said: "To be connected to the Internet is not enough, we have to look at the quality of the connection". Presenting an assessment on EU progress in information technology and e-commerce he added: "From now on, broadband will be the key issue", putting broadband access on top of the agenda of the eUrope initiative.

Fortunately the telecommunications operators and EURESCOM identified early the necessity to provide cost-efficient broadband access to the end customers, which is evident by the number of network access projects EURESCOM run in the last few years.

Where do we stand today?

There is a growing demand for bandwidth for fixed, wireless and mobile terminals. A number of new technologies have emerged and are trying to satisfy this demand. Even if each new access technology has its merits and is technologically justified, the landscape today is quite diversified leaving the customers, the network operators and the service providers with the great challenge of integrating all these technologies. At the end of the day the end user will pay for getting the value added service – like an upload of his digital photos to his Web site – and does not care too much, by which technology this will be achieved. This means that the telecommunications operators and service providers have to provide integrated services independent from the technology layer. The main challenge of this integration is the seamless provision of services across several network technologies, regardless of fixed, wireless or mobile terminals. The tutorial on Wireless Access Technologies (page 20) will give you an overview of the main technologies in the wireless and mobile area only.

There is a growing demand for bandwidth for fixed, wireless and mobile terminals

Solutions

Many of the challenges described above have been addressed in EURESCOM projects and solutions have been developed that are gradually finding their way into the deployment of broadband access solutions of the telecommunications operators in Europe.

The EURESCOM project FREEHANDS (page 9) proved that the integration of broadband wireless access systems with Full Service Access Networks (FSAN) is feasible and gives a real benefit to network operators allowing for flexibility and scalability of deployment of broadband access networks at a reduced cost.

The FAN project (page 10) has analysed the trends towards full IP-based services and is currently developing requirements for the seamless integration of service level aspects between the core network and the future access networks.

Satisfying future service scenarios with the inherent expectation of seamless access and personalised services the 'Bluetooth Access' project (page 12) paves the way for the seamless access, and establishes means for personalisation.

Addressing ubiquity

While third generation networks (3G) are being deployed, EURESCOM organises discussions for a technology roadmap for systems beyond 3G indicating advances in terminal and radio technologies as well as developments in the access-, core- and service networks (page 13), supporting the vision of the Ubiquitous Network.

Our vision is that billions of small, intelligent devices will be equipped with spontaneous networking capabilities

Support for ubiquitous computing and communications will certainly dominate the forthcoming challenges in future access networks. Our vision of the next step of the networked information society is that billions of small, intelligent devices will be equipped with spontaneous networking capabilities and have access to information and provide access to services on the Net.

The innovative solutions presented in this cover story have to be seen in this respect as part of the effort of telecommunications operators to provide flexible, scalable, and cost-efficient access to the global information superhighways.

And by the way, if you are in the market for a digital camera, watch out for the next generation models with built-in, broadband wireless access interfaces that are just emerging.

FULL SERVICES ACCESS NETWORKS
FREEHANDS PAVED THE WAY FOR INTEGRATION

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The EURESCOM Project FREEHANDS took the challenge to obtain a full insight into the capabilities of Full Services Access Network (FSAN) systems beyond the physical layer, particularly focusing on experiments on the service and application layer. FREEHANDS, which stands for 'Fibre and Radio Enhanced IntEgration in Heterogeneous Access Networks for Delivery of broadband Services', developed technology for the integration of radio access with other broadband access network technologies, and delivered an integrated architecture for enhanced flexibility and reduced cost of deployment.

FREEHANDS was a very intensive project involving a team of experts from eight partner organisations; British Telecom, Cyprus Telecommunications Authority, Deutsche Telekom, France Telecom, Telecom Italia, Telenor, Portugal Telecom and Slovak Telekom. The project delivered its final results in October 2001.

Why FREEHANDS?

Telecommunications network operators and service providers are striving to meet the increasing customer demand for broadband access, primarily for fast Internet access at present. Deploying broadband access is expensive and time consuming; therefore, operators are interested in any solution that reduces both cost and deployment time.

FREEHANDS was designed to support this process by investigating how to provide wireless access to a full services platform by integrating broadband radio access systems with Full Services Access Network (FSAN) type, ATM-based broadband optical access systems.

FSAN has defined a FTTx network architecture (FTTCab – Fibre to the cabinet, FTTH – Fibre to the home) based on ATM Passive Optical Networks (ATM-PONs, APONs). The FSAN recommended drop technology is VDSL over copper pairs, where available. However, this does not preclude the use of other drop technologies and broadband radio represents an attractive option. Its use would allow the fast deployment of services where a wired access network is not readily available thus providing added flexibility. Furthermore, broadband radio has the advantage of low installation cost.

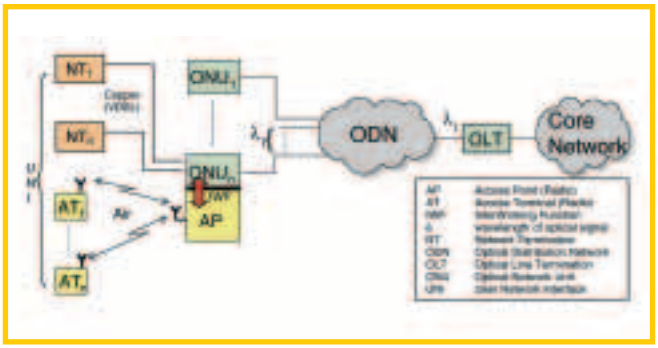
The integration of the two technologies is expected to result in an access network with media independent services. This would provide added flexibility to network operators enabling them to deploy the most suitable and efficient technology for each service and reduce overall provisioning time.

The main focus of FREEHANDS was on experiments and trials to assess the technical feasibility of FSAN radio interconnection (see figure) and potential integration. Another aspect was the quality of service that can potentially be obtained by such networks.

Broadband wireless access integration with FSAN

First, the project has verified the suitability of FSAN APON for delivering high-bandwidth services and applications through service trials. System performance and QoS were tested under critical circumstances in up to close-to-maximum throughput traffic load situations.

Furthermore, the management functionality of FSAN systems was analysed in terms of service performance monitoring and network configuration to support service provisioning.



Main conclusions

FREEHANDS has proven the feasibility of the interconnection, and potential integration of Broadband Wireless Access and FSAN systems. Using a radio drop had only marginal impact on QoS and a wide range of services could be provided media independently.

The project has also demonstrated that a closer integration, in which the FSAN APON and broadband wireless access systems are integrated below the ATM layer, has a number of advantages compared to an interconnection scenario, in which existing systems are simply connected at the ATM level.

An integrated architecture would provide the following advantages:

- Enhanced flexibility and fast access provisioning, service deployment in areas where a wired access network is not readily available or viable.
- Reduced deployment costs in areas of low user densities.
- Gradual introduction of radio carriers as demand for broadband connections grows. Furthermore, radio carriers can be dynamically allocated to the different users within an area, supporting a very efficient utilisation of resources.
- Re-use of existing secondary copper plant.

In summary, the integration of a broadband wireless system with FSAN-APON systems gives a real benefit to network operators, since the flexibility and scalability allows to deploy a broadband access network at a reduced cost.

To support the interconnection / integration we propose the following improvements:

- Increase radio channel capacity.
- Develop efficient ATM statistical multiplexing.
- Standardise the air interface at the radio side.
- Realise commercial FSAN solutions with interfaces directly supporting radio functionality.
- Enable the fitting of radio equipment into the EURESCOM street cabinet.

Impact of FREEHANDS

FREEHANDS ran in parallel with the ongoing standardisation by ETSI, the ETSI BRAN project. Throughout its course FREEHANDS made a number of proposals to the ETSI BRAN project based on its findings.

The project has made a number of presentations at international conferences and workshops. Most recently, a paper by the project was approved and will be presented at the 14th International Symposium on Services and Local access (ISSLS2002) in Seoul, Korea, on 14-18 April 2002. The project was also invited to submit a paper to the Broadband Access Systems in Wireless Communication session of the XXVIIth General Assembly of the International Union of Radio Science (URSI) that is going to take place in Maastricht, The Netherlands, 17-24 August 2002.

The high interest in the results of the project shows that it tackled a very relevant and timely issue, and considering the feedback we received, it did it very successfully.

More information on the P1015 FREEHANDS project is available at www.eurescom.de/public/projects/P1000-series/p1015.

FUTURE ACCESS NETWORKS

WILL IP-ORIENTED SOLUTIONS TAKE OVER SDH AND ATM IN ACCESS NETWORKS?

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Today, many forecasts indicate a tremendous growth of IP traffic compared to traditional circuit-switched traffic (PSTN/ISDN) that is likely to stagnate or perhaps even decline. These traffic trends are further enhanced by the expected increase in the demand for broadband video and multimedia services, which are expected to be IP-based. This creates a pressure for the seamless support of IP traffic.

On the other hand, currently deployed telecommunications access network solutions are TDM and/or ATM based. In fact ATM technology has just matured to the point where it is suitable for mass deployment in the access network. Thus, there is an apparent disparity between access network technology and service evolution.

Integration of core and access networks

Furthermore, access and core networks are clearly in different phases of development, since purely IP-based solutions are currently both available and being deployed on a large scale in core networks.

The requirement for better integration of core and access solutions and especially the demand for seamless support and efficient transport of IP traffic create a pressure on vendors and standardisation bodies to come up with access solutions clearly tailored for IP. Many vendors are working to meet this demand and bring pure IP access solutions to the market. For example, Gigabit Ethernet, which is an example of a pure IP technology, is being widely deployed and it looks like it is going to claim a substantial market share.

This otherwise straightforward trend is complicated by the continued lack of sufficient Quality of Service (QoS) guarantee by the IP protocol suite. A number of IP native techniques and mechanisms, such as MPLS (Multi Protocol Label Switching), DiffServ (Differentiated Services), COPS (Common Open Policy Service) and others are emerging that are designed to support QoS in the core network. However, it is not clear to what extent resource control and QoS mechanisms similar to those used in the core network are needed in the access network, and how they can be applied.

This lack of sufficient QoS assurance associated with the IP protocol justifies the ongoing investment in ATM in the access network.

The situation outlined above presents a considerable uncertainty to operators regarding how and when to upgrade their access networks to offer new services and reduce operational costs by adopting more efficient technologies.

The aim of the project on Future Access Networks (FAN Project) is to clarify aspects of this problem and to support network operators in their decisions. The evaluation of various access network technologies and architectures is being performed in a medium term scenario, based on service requirements (e.g. availability, QoS including delay and jitter, scalability, interworking with the core network etc.).

In particular, the applicability of various IP-based QoS mechanisms that guarantee the QoS required for transporting various conventional and broadband services is being analysed and evaluated. Possible reference configurations and evolutionary scenarios are being identified and investigated with the objective of supporting the provisioning of a comprehensive set of services.

In addition to establishing the advantages and disadvantages of the different technologies the following are also being investigated:

- Impact of different technologies on the access network architecture
- Access network evolution
- Interworking with the core network.

Technical aspects and way of working

The project has evaluated the potential future roles of IP, MPLS and Ethernet technologies in the access network (Figure 1). Currently various possible reference configurations and evolutionary scenarios are being identified and investigated that can support the provisioning of a comprehensive set of services.

Different access technologies such as xDSL (Digital Subscriber Line of any type), WDM PON (Wavelength Division Multiplexing Passive Optical Network), Gigabit/Ethernet, Cable and Radio are being compared.

The project also addresses:

- Evaluation of the merits of the different feeder and last mile service delivery technologies
- Impact of the emerging service transport solutions (such as Ethernet PON, Gigabit Ethernet, MPLS) on the access network architecture
- Access network evolutionary path
- Ability of the access network to interface with service nodes and with the core network.

While the project focuses mainly on technical issues, economic and regulatory aspects, e.g. local loop unbundling, and relevant standardisation activities of FSAN (Full Service Access Network), ITU-T and IEEE are also considered.

In order to obtain a perspective that is not limited to the views of a set of operators the project maintains a dialogue with a broad set of access systems vendors.

Main conclusions

The initial results show the availability of routing and switching features that, in principle, can realise the functionality currently provided by SDH and ATM transport, and also adequate QoS mechanisms. The project has found that existing access network architecture standards, e.g. in ITU-T Rec. G.902, are tailored to conventional telephony. There is a burning need to develop new access network architectures designed to support emerging video and multi-media services and using more data and packet oriented transport and traffic handling technologies.

However, further investigations are required into:

- The complexity of implementing such Layer 2 and/or Layer 3 switching
- Routing and QoS functions
- The management of such solutions
- The costs related to such solutions.

The project aims to clarify how far the data centric solutions would expand from customer terminals and networks and from the IP-based core network within the access network to provide a continuum for the provisioning of a wide range of services (with Service Level Agreements, where needed for business customers). We also expect to demonstrate that by adopting future access networks the cost of deployment, operation and maintenance can be reduced compared

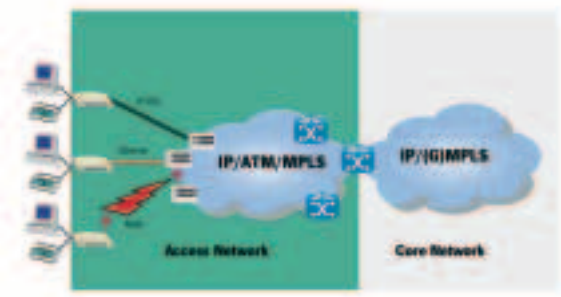
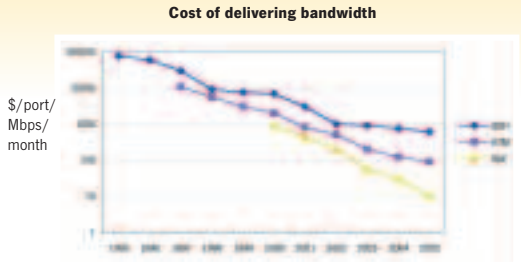


Figure 1



Source: BCR, Peter Sevcik, NetForecast

Figure 2

to legacy (TDM, SDH-based) access network solutions. Figure 2 shows a forecast that points into this direction.

In summary, the project will present access network solutions based on the extensive use of Gigabit Ethernet over fibre, and of MPLS and IP-based solutions to transport data between the customers and the service nodes and core transport networks. The project will develop likely migration scenarios towards these solutions. The project is also expected to significantly contribute towards clarifying whether ATM will continue to have a role to play in future access networks.

More information on the P1117 Future Access Networks project is available at http://www.eurescom.de/public/projects/P1100-series/P1117.

BLUETOOTH ACCESS

AN ALTERNATIVE TECHNOLOGY FOR ACCESSING THE GLOBAL NETWORK

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Many articles have been published recently with regard to the 'comeback' of Bluetooth. It looks like finally the right momentum is building up behind the technology, as more and more manufacturers are shipping their products with embedded Bluetooth capability. This article, based on the experiences gathered within the collaborative EURESCOM project on Bluetooth access (P1118), is giving the insiders' view on Bluetooth used as an access technology.

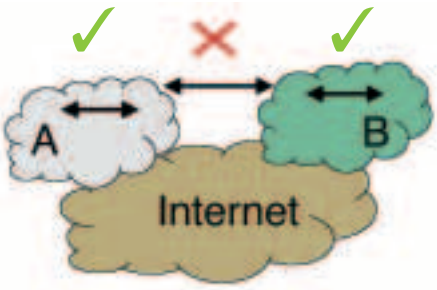
With the rapid deployment of wireless LAN technology, in particular WiFi (IEEE 802.11b), it seemed that Bluetooth was to pay for the hype unmet by the availability of cheap products. As more and more Bluetooth products become available on the market and prices go down, it looks as though it will not be a matter of choice between the two technologies but there will be place for coexistence of both to satisfy complementary users' needs. This article explains why.

To Bluetooth...

It is well known that Bluetooth was originally designed as a cable replacement technology. As such it has all the helpful features to support interaction between devices in a wireless personal environment where there is a limited number of devices in close range with each other. These devices are logically related either by ownership (they all provide a different service to their owner) or by an underlying social interaction between their owners (e.g. a meeting scenario between two or more people). Wouldn't it be nice to get these features as well as the ability to connect the personal wireless bubble to the global network to exploit the vast amount of information out there?

...or not to Bluetooth...

Of course this was a rhetoric question since the answer can only be "yes", please, and as soon as possible". Can Bluetooth do that? The answer is again "yes", but with some reservations. Amongst the wealth of profile specifications there are a couple that allow Bluetooth devices to get global data network connectivity. The reservations are due to the fact that Bluetooth technology is not quite there yet to support neither



truly seamless interaction between devices, nor seamless roaming of single devices between Access Points. The first problem is due to the need for "pairing" two devices before they can interact with each other. That adds security but needs some exchange of information that the user has to put in. The second problem is due to the fact that Bluetooth was originally designed as a cable replacement technology. As a result it works fine only in a nomadic type of mobility. This is the case where the user, moving between two distant locations A and B, can experience wireless connectivity, but only moving "within A" or "within B" rather than "between A and B" (see figure).

The current Bluetooth specifications do not support handover management to guarantee session continuity while moving from the area covered by one Access Point to the neighbouring one.

Are these however big problems?

...that's the question!

Obviously not! The need for pairing can hamper seamless interaction between devices owned by different people, but if all the devices are within somebody's wireless personal environment, there is some underlying relationship between these devices (same owner or social interaction between owners – meeting scenario). In this case pairing them should not be a big problem. As far as the seamless mobility problem is concerned, Bluetooth versatility comes in helpful. So if someone really needs connectivity while travelling between A and B, he/she could as well connect through the cellular network via a mobile phone used as a gateway – thanks to another one of the Bluetooth profile specifications. The real question then is, what are the user's requirements in terms of access to the network? If only data network access is required, e.g. throughout a corporate building, then WiFi is the answer. However, if data network access is important as well as some nice little extras, such as service discovery, object exchange, synchronisation, or hands-free telephony, then Bluetooth is the answer. So why not have them both?

Conclusion

In its original design the Bluetooth technology was carved around the needs of users for which data network access was one of many requirements. That makes the technology perhaps less suitable than its counterpart 802.11b, if only wireless data network access is needed. However, would you resist to the temptations of all the extra features offered by Bluetooth?

For more information, please see the P1118 project Web pages at:
http://www.eurescom.de/public/projects/P1100-series/P1118

SEAMLESS ACCESS

WITH BLUETOOTH – PRIVATE AND PUBLIC ACCESS NETWORKS FOR PERSONALISED SERVICES

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Having moved to wireless and mobile telephony, we have also changed our habits. Arrangements are made while being on the way, and destinations are not longer found by maps, but by questions to your mobile device such as "Where should I go now?" The move from fixed Internet access to mobile access will result in new ways of behaviour, some of them already being visible now.

Location-based services are evolving, and the question "Where are my friends just now?" and "What can we do here?" will be more frequently asked in the future. People will continue to be on the move, and expect to have their personalised information following them.

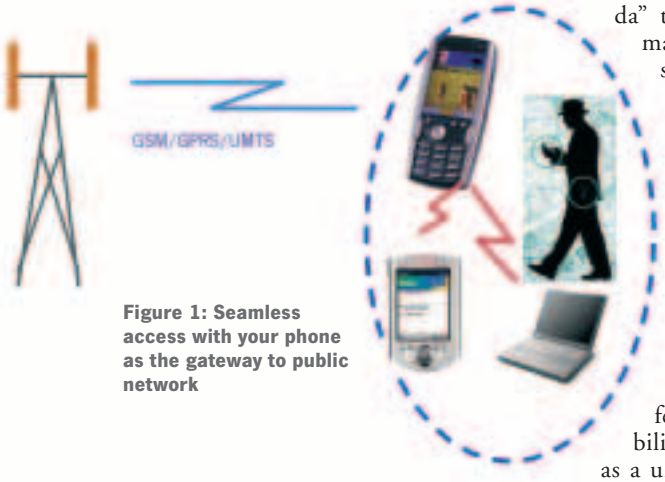

Figure 1: Seamless access with your phone as the gateway to public network

Seamless personalised access

What is common in most of the future scenarios is the expectation of seamless access and personalised services. EURESCOM's project 'Bluetooth Access' (P1118) paves the way for the seamless access, and establishes means for personalisation. Undoubtedly, Bluetooth has the capabilities to provide seamless access. It is not as specialised as WLAN; it is more an all-round tool to serve interconnectivities of all our devices. The technology is cheap, current estimations are € 2 for a two-chip solution and € 5 for the single-chip implementation. Bluetooth has low power consumption, and the Bluetooth profiles allow interconnectivity. Most of the profiles are software based, and allow a reconfiguration of the capabilities of your devices.

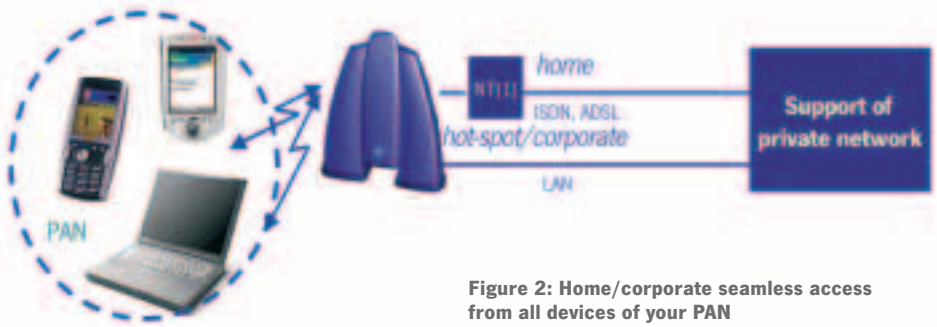

Figure 2: Home/corporate seamless access from all devices of your PAN

On the move

Today, we tell people to call us on "my mobile", and for those who travel on business the laptop is part of the luggage. But we still lack communication between the devices and tools to transfer "my agenda" to the mobile phone. The main reason for this is the stone-age technology of laptops: It takes "hours" to boot, and the laptops are always "off-line". PDAs are bridging the gap, being online all the time and synchronised with the PC. All these devices will interact seamlessly with the help of Bluetooth and form the "Personal Access Network" (PAN). The devices have different communication capabilities, but Bluetooth will act as a unifier, allowing the mobile phone – with GPRS or UMTS – to be the gateway towards the public network (see figure 1).

Visiting access

Broadband access is available at all companies and more and more at private homes. But the access is usually hidden, because it is cable based. Bluetooth and WLAN will open the access for the devices of your PAN, and will allow to be always best connected with all your devices (see figure 2).

Wireless access also enables visiting services, e.g. providing visitors with local information or general access to the Internet. Companies have identified the provision of this local and global information as a service to their visitors. P1118 has taken the idea further, and has established concepts for an open visitor access to the private home.

Security and privacy

An open wireless access will ease the usage of broadband services, but needs mechanisms for security and privacy. P1118 favours the authentication through the mobile phone, as illustrated in figure 3.

Customers trust communication in the operator's network, and this network can be used to distribute security tools, e.g. an encryption key. Having distributed both the identity (from the SIM) and the encryption key to the devices of the PAN, the user can have a seamless and secure connection from his PC or PDA to the network.

Conclusion

Key elements of future communication scenarios are seamless access and personalised services. Bluetooth is the key technology to distribute the user's login identity to all the devices of his Personal Access Network (PAN). All devices can use this identity to connect seamlessly to their preferred network. This will also prepare the way for personalised services users want. More information about Bluetooth Access is available at http://www.eurescom.de/public/projects/p1100-series/P1118/

Figure 3: Authentication and security in your "personal sphere" provided by the SIM

A ROADMAP FOR MOBILE AND WIRELESS SYSTEMS BEYOND 3G

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Third generation networks (3G) are currently being deployed. While this is happening, discussions have emerged on how to extend the public cellular network with local area and "hot spot" access using advanced access technologies, which are commercially available.

A typical user scenario during a normal working day includes activities at home, at the office/work, at "hot spots", and on the move (figure 1).

Common to all these scenarios is the fact that the user wants to have an easy and fast access to a variety of information services from any place including moving between different places. Current access solutions are all technology based and restricted to the capabilities of that specific technology. Next generation systems have to provide services beyond the limitations of just one access method/technology through seamless integration of heterogeneous access networks. A future solution will provide an integrated heterogeneous access giving the user optimum services depending on his terminal and access capabilities, his preferences and the service/application situation he/she expects.

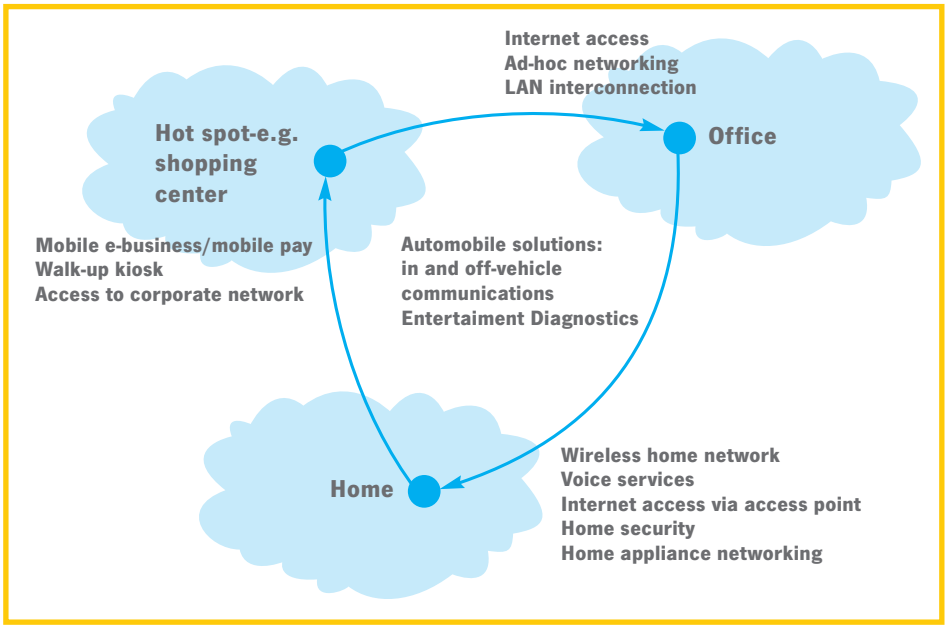

Figure 1: Typical usage scenarios

EURESCOM has performed several projects addressing the evolution of 3G systems and services, and studied the influence that the IP technology will have on this evolution. Two projects are of particular interest when discussing a technology roadmap for the evolution of access methods beyond the third generation: P1046 "Next General Service Delivery" and P1145 "4G – the next frontier?"

As part of the study on "4G – the next frontier", a workshop was organised with experts from operators, suppliers, vendors and standardisation bodies discussing user aspects, service deployment, network technologies and the support of future business models. One important result of this workshop was a technology roadmap for systems beyond 3G indicating advances in terminal and radio technologies as well as developments in the access-, core- and service networks (figure 2).

These and similar issues are currently being discussed in context with the planning for the 6th Framework Programme for Research and Technology Development of the European Commission (FP6).

EURESCOM is working closely together with other sector actors, mainly those of the WWRF (Wireless World Research Forum), to provide a consolidated industry view on a research framework for the wireless world for the period 2002 – 2006.

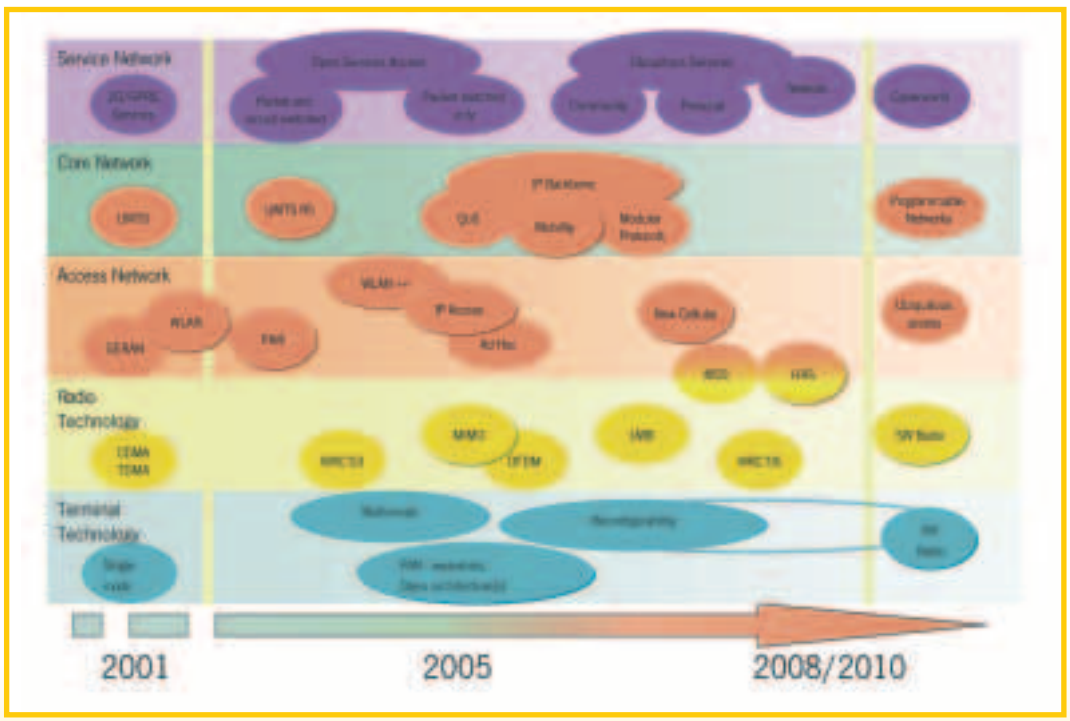

Figure 2: Roadmap for systems beyond 3G

ELISA COMMUNICATIONS CORPORATION

OLD OF AGE AND YOUNG AT HEART

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Elisa Communications Corporation this year celebrates its 120th anniversary. Despite Elisa's very respectable age, we still feel very young and active. This is especially true for the Elisa Communications Research Center. It just found its new home under the roof of Elisa Innovations. This has been part of the latest organisational effort in our corporate strategy to combine the latest technology and an innovative marketing approach.

It all started 120 years ago, when "Helsinki Telephony Society" was given the permission to operate on 31 January 1882. From those times through incremental changes of both name and organisation the company now exists as Elisa Communications Corporation. The company is listed at the Helsinki stock exchange and its ownership is widely spread in Finland. The corporation currently has about 8,700 employees.

Elisa offers an extensive range of services for private and organisational customers in fixed, mobile, and data networks as well as latest technology for network management and customer support solutions. By the end of September 2001 Elisa Group had a total of 1.5 million fixed subscriptions, equalling a market share of over 35 per cent of fixed subscriptions in Finland. Elisa Communications' mobile operations subsidiary Radiolinja had about 1.3 million subscribers at the same time.

Elisa is focused on enabling its customers' success and wellbeing. Elisa Communications Corporation offers to its customers the possibility of transmitting information, services and experiences electronically in ways that are free from the restrictions of time, place and media.

The major areas of activity are the service operator business, mobile business, network business and other business.

The service operator business consists of ElisaCom Ltd, ISP activities, invoicing, data services, international calls as well as managing the local telcos being Elisa's subsidiaries outside Helsinki region, to name some of the major activities.

The mobile business consists of Oy Radiolinja Ab Group, the mobile operator and the sales and distribution organisation.

The other business including the international operations and for instance Comptel Ltd, whose mission is to help operators to succeed in their businesses by providing them with the world's leading mediation software and business-to-business solutions.

The other business includes the international operations and, for instance, Comptel Ltd, whose mission is to help operators to succeed in their businesses by providing them with the world's leading mediation software and business-to-business solutions.

Research activities at Elisa

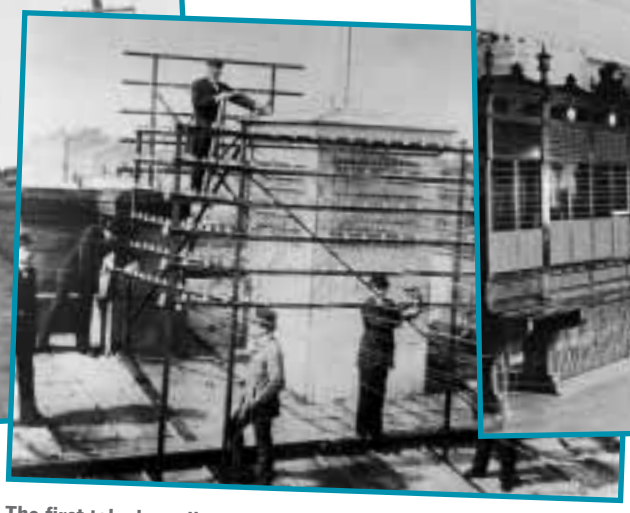
Since 1 February 2002 the research activities at Elisa are part of a new organisational unit called Elisa Innovations. Apart from the Research Center, Elisa Innovations includes a business incubator, External Ventures and IPR and regulation activities.

The Research Center has been focussing not only on emerging technologies, application and network activities, but also on customer-centric research activities consisting of research in the areas of users, usability, consumers, and user interfaces. The goal is to achieve an optimum in exploiting especially qualitative methods in order to speed up the whole R&D process and get the kind of products and services that are based on real needs faster to the market.

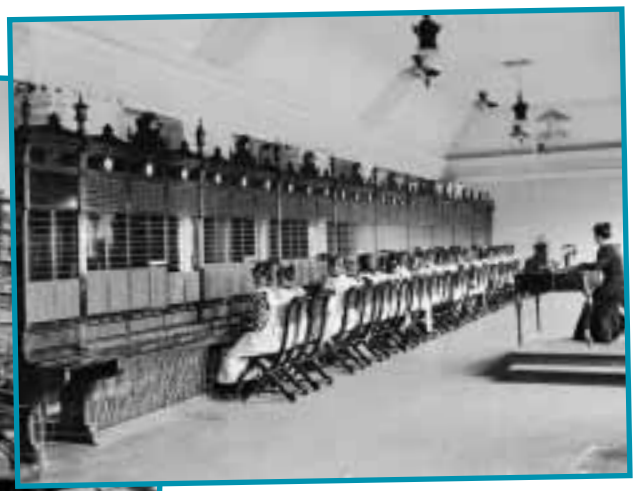
Based on the latest technology, the task of our customer-centric research activities is to create a base for strategic decision-making, fast and leading edge development of services and products, and to ensure the competitiveness in highly dynamic market place. The more technically focussed, special areas of Elisa's research include mobile networks and services, wireless data transfer, broadband networks, IP-based solutions, application integration and IT security.

From the early days of Elisa

Network maintenance in the 1890s.



The first telephone lines on the roofs of Helsinki in the 1890s.



Manually operated telephone exchange in the 1890s.

The essentially important way of doing our research is collaboration. For years, EURESCOM has been one of the most important forums for that. We have also an extensive portfolio of EU projects, and our collaborative activities include also forums like W3C (World Wide Web Consortium) and most important "substantial" forums like IETF and others. Our ambitious aim is to work together with the leading edge organisations. Therefore, we take our own research commitments very seriously – aiming to be a desired R&D partner also in the future.

Matti Mattheiszen,
President and CEO since 1997.

Elisa and EURESCOM

For years Elisa has been an active participant in the EURESCOM community. Currently Elisa is, for example, leading the N-GOSSIP project, which is focussing on next generation networks and SIP. One of the areas, where Elisa has been very active, are issues related to customer-centric as well as marketplace-related research, like the Future CAMERA project (P1144). Elisa also heavily contributed to EURESCOM research activities in the 'Customers and Markets' area, where a consequent qualitative and multidisciplinary approach has been pursued. From the same domain are also the projects P1102 – Mobile Electronic Commerce (eMporio), P1146 GOLD – Getting OnLine Communities to Develop, and P1119 The Third Dimension – Human-Centred Approach to Designing New Mobile Services for Different Terminal Equipment.

Another important area of research are mobile issues, in the frontline the 'Beyond 3G' research, formerly called '4G', when, for example, the study P1145 '4G the next frontier' was running. There are quite a few other activities, also from more technical areas, like the Tsunami IPv6 project P1113. Our participation and the results of the projects, in which we participated, have been widely recognised, and we are looking forward to new interesting challenges for pre-competitive collaboration also in future.

Conclusion

Elisa Communications Corporation is one of the very old telephone companies in Europe, but is very young at heart, especially regarding our research activities. The wide range, of innovative areas, from networks and applications to digital economy issues, and the collaborative spirit, which was proven by many collaborative research activities, will ensure that Elisa's genuine touch to business will stay alive in the future.

Elisa Headquarters in Helsinki

ELISA COMMUNICATIONS RESEARCH CENTER

Research areas:
Network services, Internet applications for service providers, integrated services development, mobile technologies and services, multimedia laboratory 'Elisa Future Club'

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OSA AND PARLAY – READY FOR DEPLOYMENT?

EURESCOM WORKSHOP PRESENTED SOLUTIONS FOR THE OPEN SERVICES MARKET

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The EURESCOM workshop "OSA and Parlay – Facilitating the Open Services Market" took place at the EURESCOM premises in Heidelberg from 19-20 February 2002. It attracted 127 attendees, who represented network operators, manufacturers, regulators and universities from Europe, America and Asia. At an exhibition area several leading vendors were showing their latest developments and products.

The objective of the workshop was to identify and discuss opportunities and technical solutions that will lead to a wide deployment of OSA and Parlay in the Open Services Market. In an open services market, network operators will have to provide highly secure, open, standard interfaces to their networks. Many argue that the way for operators to do so is to provide Parlay/OSA interfaces. These interfaces give service providers a set of high quality, reliable capabilities on which to base their services.

The new business opportunities for the network operators may be increased revenue based on an increased traffic volume and by selling access to the capabilities offered by the interfaces. The technologies supporting OSA may also ease the migration to Next Generation Service Platforms, which may lead to reductions in overall platform costs, and reduced development timescales.

Two keynote speeches by Zygmunt Lozinski, the president of The Parlay Group, and Ard-Jan Moerdijk, chairman of the 3GPP OSA workgroup, presented the state-of-the-art and latest news from the standardisation bodies. Zygmunt Lozinski explained that an important goal for OSA/Parlay is to bridge the gap between the telco and the IT world: "There are 3 million of Visual Basic programmers, 2 million for Cobol, 1.5 million for C++ and Java each, and we have to reach this community and enable them to develop applications for telecommunications". He stressed that Parlay isn't just about 3G, but can be used in fixed, mobile and IP networks. The role of EURESCOM in OSA/Parlay standardisation was highlighted by Ard-Jan Moerdijk as he gave credit to the various contributions from EURESCOM project P1110 towards these standardisation bodies.

Keynote speaker Ard-Jan Moerdijk.

The presentations at the workshop were discussing the OSA/Parlay technologies, implementations and service opportunities as well as further evolutions and the role of OSA/Parlay in Next Generation Networks.

The challenge of the industry to take OSA and Parlay from specifications to first commercial products has already been mastered. A panel session focussed on the business aspects and how OSA/Parlay can now be brought into operator's networks. "Current OSA/Parlay products do not enable the creation of services beyond current Intelligent Network services", said Carlo Licciardi from Telecom Italia Lab, "so why should an operator deploy this technology?". The panel underlined that a simplification of the OSA/Parlay interfaces seems necessary in order to reach the huge potential of programmers in the IT world. Parlay X, a new initiative within the Parlay standardisation, was seen by the panel participants as a promising activity to move towards this goal.

The workshop participants expressed their great satisfaction with the workshop. The best speaker award went to Zygmunt Lozinski from IBM/The Parlay Group for his presentation on 'Parlay and Web services'.

For those who missed the event, a CD is available with audio/video streams of all presentations. Details can be found at www.eurescom.de/osa-workshop.

Panel discussion about business opportunities (from left): Uwe Klatt (Siemens), Lucas Klostermann (Ericsson), Zygmunt Lozinski (IBM), Chelo Abarca (Alcatel). Not on the picture: Annegret Kübler-Bork (German regulatory authority RegTP), David Kennedy (EURESCOM), Gary Bruce (Sun Microsystems), Carlo Licciardi (Telecom Italia Lab), Ard-Jan Moerdijk (Ericsson).

127 participants attended the workshop.

EURESCOM WORKSHOP ON 'WIRELESS ACCESS' IN HEIDELBERG

On 12-13 March 2002 EURESCOM organised a workshop on 'Wireless Access', which took place at the EURESCOM premises in Heidelberg. International telecom experts discussed crucial questions regarding the future prospects of wireless access technologies. Researchers from Deutsche Telekom, France Télécom, Telenor, Nokia, Ericsson and other leading companies presented their insights.

Cutting-edge research results by EURESCOM projects addressing issues in the area of Bluetooth, Wireless LAN access, GPRS and UMTS were presented for the first time to the public. Exhibitions and demonstrations complemented the programme showing private and corporate applications for wireless access. A number of vendors demonstrated their latest technical solutions for supporting those applications, using in particular Bluetooth access.

Presentations from the workshop are available at:
http://www.eurescom.de/public/Events/WirelessAccess

DO INTELLIGENT TECHNIQUES AID FRAUD DETECTION?

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Telecommunications fraud is a worldwide problem with substantial annual revenue losses. Fraud also leads to the deterioration of a Telco's public image and is therefore an important risk to their businesses. Conventional fraud detection methods based on simple thresholds are used to deal with most current fraud problems. However, some problems remain unsolved by these traditional methods.

It has been proposed that intelligent techniques could be successful in fighting these problems. EURESCOM project P1007 investigated how intelligent techniques can aid, or even replace existing conventional methods.

Fraud management

A fraud management system (FMS) identifies fraudulent or suspicious situations by using specific criteria to analyse a large amount of call data records and other subscriber information. Rules that govern its operation are strictly defined, leading to results obtained on the basis of a deterministic behaviour. Nonetheless, a fraud management system will only detect fraudulent activity, if the fraud manager defines the correct criteria to identify them. The logical process used by analysts to evaluate, understand and break down fraudulent situations is quite complex and many different factors, like experience, interpretation of information and intuition of anomalous situations, could influence the final decision. In order to avoid the uncertainty due to the human factor, analysts must be given adequate training for case treatment. Although different analysts may draw different conclusions as a result of this mental process, two skilled analysts are more likely to draw the same conclusion. However, to arrive at a conclusion there is a series of steps that must be carried out. These steps are known as the fraud management process as illustrated in Figure 1.

The first step regards the analyst's choice of the rules and criteria, which build up the design of the on-line detection engine within the FMS. Its activity is focused on the selection of suspicious or anomalous cases among normal usage of telecommu-

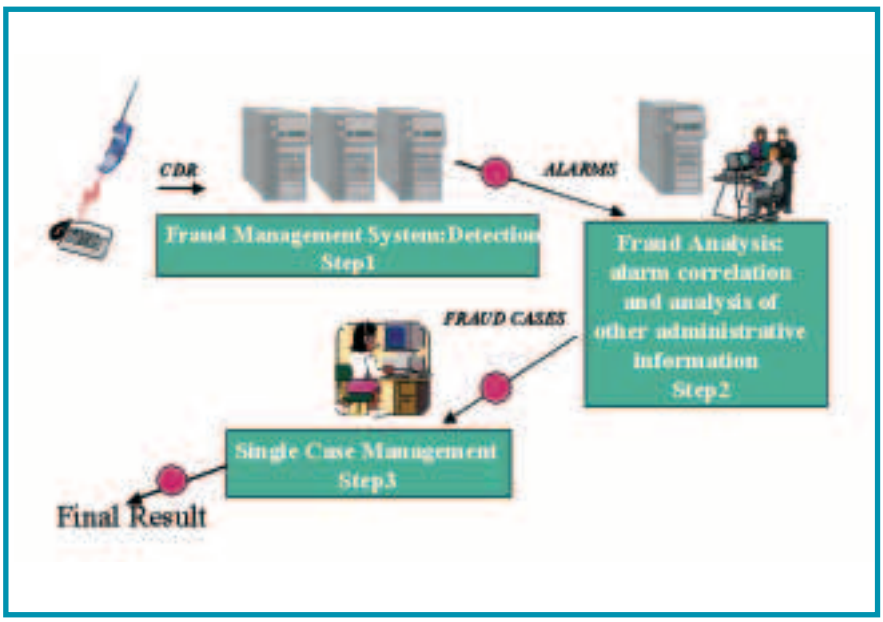

Figure 1: Fraud management process

nication services. The second step is related to the evaluation of the cases detected by the FMS, according to other customer information such as billing or administrative information. The third step is carried out by the analyst and results in a decision to either take or not to take action for that particular case.

FMS performance

The main objective of a FMS is to detect as many fraudulent cases as possible, giving a priority order based on the evaluation of potential losses while automatically disregarding non-fraud situations. It is therefore important to be able to measure the performance of the entire decision process in order to optimise it. Measurements must be taken on the number of cases, costs involved, and workflow times. The red dots in figure 1 pinpoint the usual places at which these measurements are made.

It is possible to identify different sets of indicators for measuring how well a decision process is carried out. A complete and efficient set of indicators (see table) allows the analyst to identify the reasons of poor performance and even suggest necessary actions.

Scope of P1007

The goal of EURESCOM's project P1007 was to evaluate how the use of intelligent techniques could be applied to aid current FMS in better detecting fraudulent activity. The project started off by surveying the types of fraud that Telcos are faced with or expected to encounter in the near future.

A variety of techniques were then chosen and applied to three different scenarios:

- Call Sell Operation (CSO),
- Detecting Fraud with Limited Data (DFLI) and
- IP fraud.

The metrics identified in the table were used to measure overall performance of these prototypes. However, due to the inherent differences between the prototypes, distinct sets of input data were used and as a consequence any direct comparison between the prototypes is not possible.

Table: Performance indicators

Performance Indicator	Description
Fraud Prevalence	The overall presence of fraud
Sensitivity	The ability in detecting fraud cases
Specificity	The ability in disregarding non fraud cases
Indifference	Lack of alarm
Susceptibility	False alarm
True Positive Predictability	Confidence for a positive of being a true positive
True Negative Predictability	Confidence for a negative of being a true negative
Efficiency	Overall efficiency

Call Sell Operation

In simple terms, Call Sell Operation (CSO) is the illegal re-selling of telephony services. A fully-fledged FMS will consider several inputs, like existing Call Data Records (CDR) and customer details, to detect this type of fraud. However, in the context of investigating the intelligent techniques potential and due to confidentiality or privacy concerns with customer data, the only data used in the P1007 CSO prototype were the CDR data feed from which user profiles were also created. The prototype was developed specifically to tackle the Call Sell Operation problem area and solely analyses calling patterns that are, in general, unique to this problem domain.

As depicted in figure 2, this prototype implemented a two-pass approach. The first pass consisted of automatically generated regression trees and a traditional technique based on pure thresholding. This first pass does an initial filtering of the data that is then subject to the computationally intense analysis conducted by the intelligent techniques of the second pass. These second pass techniques were based on Case Based Reasoning and made extensive use of Nearest Neighbours, Radial Base Function Networks and Clustering algorithms.

For a two-pass approach to detect CSO through the use of switch CDRs, we can safely conclude that with the introduction of intelligent techniques the first pass does neither become more effective nor more efficient. The results obtained with such techniques can be accomplished by simply lowering the configuration values in the straightforward rule-based threshold techniques.

The real benefit of using intelligent techniques becomes clear in the second pass where these techniques are processing less – filtered – data and may thus invest more processing power in analysing and validating cases that have initially raised suspicion. However, as with any self-learning technique, it is imperative that both the training and validation data sets mimic as closely as possible the characteristics of real world scenarios as well as reflect the calling trends for the geographical region it is intended for.

Detecting Fraud with Limited Data

This Detecting Fraud with Limited Data (DFLI) prototype implemented a wholly new idea with the main goal of analysing how well fraud could be detected using a restricted subset of CDR fields. No cost information or event duration information was provided to the prototype. This was a deliberate act calculated to challenge the perception that effective fraud detec-

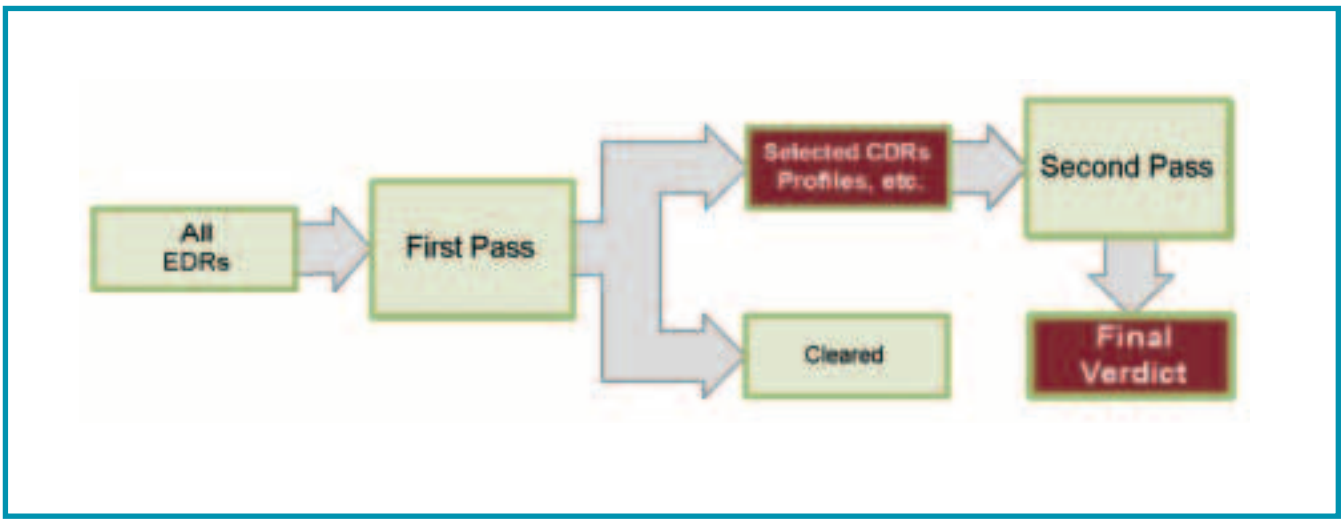

Figure 2.: Two-pass architecture

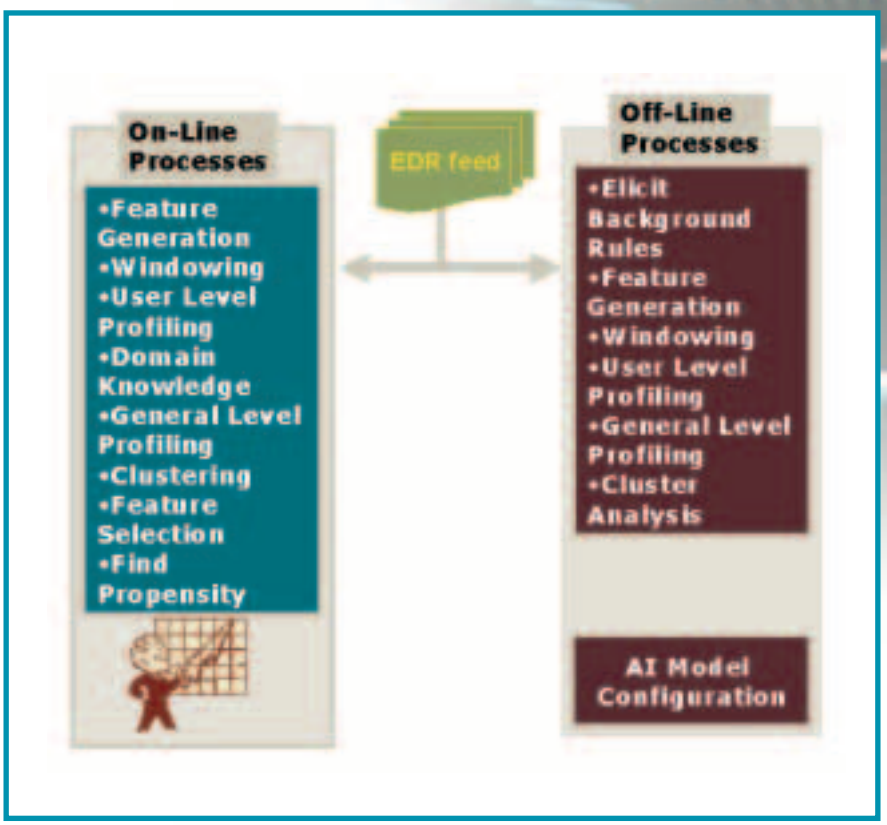

Figure 3: 'Champion and challenger' approach

tion relies heavily on analysis of all available information.

A 'champion and challenger' approach to creating an effective system was adopted. As a result the test data was fed through an on-line module (champion) and analysed for suspicious activity. In parallel to this, the data input was fed into an off-line module (challenger) of similar characteristic to the on-line module. The on-line and off-line modules, as well as their functionality, are shown in figure 3. The results from both modules are constantly being evaluated. Once the off-line module starts producing better results it will substitute the on-line module and the process is stated over again.

The results produced from the very limited data set provided for testing suggest that effective fraud detection can be achieved using a subset of the available data typically fed into a fraud management system.

Moreover, when compared with commercial benchmarks the DFLI prototype results might well be regarded as extraordinary, and time should be invested to eliminate the possibility of spurious features or other biases that may have entered into the data sample unwittingly.

IP fraud

In the IP arena, the business model is quite different from traditional telephony services. The Internet and IP bring new business models involving several different actors. These actors include content providers, service providers, network operators, customers, but also fraudsters. A telecom operator may take on several roles, e.g. act as both network operator and service provider. However, the business models imposed by this Internet-enabled environment indicate that roles and actors will be dynamic in nature. Unfortunately, this also opens for a plethora of possible frauds. The project has focused on illegal redistribution, excess download and subscription fraud.

One of the most promising methods used in the IP fraud prototype dealt with a relatively new area called Emerging Pattern Detection (EPD). The purpose of the EPD is here to introduce to FMS a functionality capable of detecting and identifying new kinds of frauds or new ways of committing known frauds. Basically, the method compares two data sets D1 and D2, where D1 is a reference data set (supposedly without fraud) and D2 is a target data set (possibly containing fraud). In the IP fraud prototype, the EPD should determine whether there were patterns in D2, which did not appear in D1, or, if patterns existed, whose frequency of appearance had increased from D1 to D2 with a specified growth rate. The intent was to detect and identify, each individual pattern, i.e. to identify, which attributes specify the pattern.

Using EPD permitted to detect the types of fraud that were present in the D2 data set. However, we should be aware that an operational fraud detection situation is much more complicated than our experimental situation. In short, the technique of Emerging Pattern Detection (EPD) is very promising and deserves further consideration. In addition to the purpose the EPD was originally intended for, the experimental results suggest that the EPD offers a very efficient alternative to combinations of other intelligent techniques for detecting known types of fraud, or suggesting or selecting indicators of new or already known kinds of fraud.

Final assessments

Intelligent techniques proved to be useful in all three of the prototypes developed. However, discarding simpler, more traditional techniques is not a viable option yet. These traditional techniques allow fast processing of large volumes of data. Intelligent techniques need more processing power, and hence are slower. A hybrid approach seems the best way of combining the best aspects of both worlds.

Intelligent techniques proved that they could improve the amount of fraud being caught, catching fraud that has no simple footprint. As fraud evolves along with the networks, it will become subtler yet of higher risk to Telcos. In this scenario intelligent techniques will be needed to find deeply rooted indicators of fraud. However, due to the increase in information, more traditional and faster techniques will be needed to filter the majority of non-fraudulent traffic.

Each intelligent technique represented by a prototype delivered very promising results that are detailed in the final P1007 documentation. Further testing of these and of new techniques needs to be carried out. However, judging by the results obtained from the experiments, intelligent techniques may have a part to play in the future of fraud detection.

Further information is available at: http://www.eurescom.de/public/projects/P1000-series/p1007/

SUCCESS FACTORS OF ONLINE BUSINESS COMMUNITIES

THE EURESCOM GOLD STUDY

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The interest in creating online communities has led to the design of many integrated communications platforms. They all offer a wide assortment of information and communications technologies. Yet these are often under-used. The EURESCOM study GOLD – Getting On-line Communities to Develop (P1146) has shown that there is more to ensuring the success of an online professional community than just providing an assortment of electronic tools.

Many other factors have an influence on community success, including member behaviour, the procedure used to set up the community, and ensuring the provided tools match the community's requirements.

Data from five professional communities

The GOLD study team used a variety of methods – quantitative (logging data and questionnaires) and qualitative (interviews, diaries, focus groups, role plays) – to collect data from five different professional communities across Europe. Some of these communities' members were widely distributed across countries, whilst others were mainly located in the same building. The size of these communities ranged from 7 to 80 members, and whilst two could be seen as learning communities, the rest were 'business' communities completing various collaborative projects. Despite these differences, a surprising number of common needs emerged.

Media stickiness

The widespread use of e-mail was extremely apparent. This tool is unique amongst communication technologies, because it crosses the boundaries between formal and informal communication. Other tools are perceived as being appropriate for either informal communication, such as Instant Messaging, or formal communication, such as conferencing tools. E-mail is seen as the 'default' tool for community communication, also because most people have access to it and already use it for other communications. 'Media stickiness' is another reason for the reliance on e-mail – people tend to stick to tools they are familiar with, generally overestimating the time and effort it would take to learn how to use a new communication tool.

Drivers and barriers for communication tools

Here are some examples of major drivers and barriers for different communication tools:

- **E-mail**
  Driver: widespread use and availability.
  Barrier: information overload.
- **Fixed line phone**
  Driver: instant response, easy for decision making. Barrier: fixed location.
- **Audio conferencing**
  Driver: enables many to many communication. Barrier: not always well managed or structured.

The most common barriers to the uptake of new tools are:

- reluctance to learn to use new tools,
- lack of technical support,
- the 'critical mass' for a new service or tool is often not reached.

The major unmet needs

The survey of the five investigated on-line communities showed the following major unmet needs:

- Technical training
- Technical support of the tools and systems
- Easier remote and e-mail access
- More face to face meetings for distributed communities
- Easily accessible shared file storage, particularly for work in progress

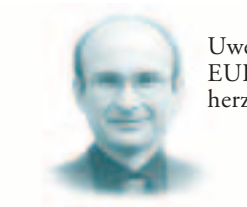
Many other unmet needs were uncovered during this study. However, these were applicable to certain types of community, illustrating that it was the type, size and location of the community that determined most of their needs.

Conclusion

By understanding how and why on-line community members use these tools, and what are their unmet requirements, we can design tools and integrated platforms that meet their needs in a better way. Besides the provision of user-friendly platforms themselves, it is extremely important that those platforms are introduced to the on-line community before the members have established their own communication patterns and methods.

Please see http://www.eurescom.de/public/projects/P1100-series/P1146 for further information.

WIRELESS ACCESS
TECHNOLOGIES



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During the past few years there has been a 'boom' in the area of wireless access technologies in telecommunications. Many new technologies emerged on the market and some, like Bluetooth or Wireless LAN, are widely discussed in public. This tutorial wants to give a short overview of major wireless access technologies, including their main features and application fields, as well as a short comparison.

In the past, access systems in telecommunications or computer networks were mainly based on fixed wired access, making the device quite immobile. The introduction of wireless access technologies allowed a certain degree of mobility. This enabled users to communicate or to transfer data independent of their current location or their movement. A second important aspect was that users got rid of cumbersome cables. Wireless access as described here will focus on bi-directional connections between the user's device and a counterpart on the network side using radio waves. Other technologies, for instance infrared access or unidirectional ones like Digital Audio/Video Broadcasting, are not considered here.

Mobile or only wireless

The aspect of 'wireless vs. mobile' might need some clarification, as it seems that there has been some confusion around these terms recently: A wireless access itself can allow only a very limited mobility within the range of this access point. True mobility can, however, only be achieved by an underlying mobile network, which implements the mobility across the whole covered area. This may be important to keep in mind when comparing access technologies. This tutorial focuses on the wireless access part mainly and does not discuss a possible mobile network behind.

Cordless phones

Cordless phones became very popular in the early 1990s. The first terminals were using some analogue transmission technologies. Very soon another standard called **DECT** (Digital Enhanced Cordless Telecommunications) was introduced and is now the dominant standard in cordless phones. DECT was developed by the European Telecommunication Standard Institute ETSI from 1988 on. DECT can be applied to implement wireless Private Branch Exchanges (PBX), residential cordless phones, wireless access to the public switched telephone network, Closed User Groups (CUGs), Local Area Networks, and more. In spite of all these capabilities DECT is today mainly used in residential cordless phones. Today there are about 60 million DECT phones on the market. DECT transmits radio signals at around 1900 MHz in a reserved band, which minimises interference problems. Good voice quality is achieved by digitally coding voice into a 32 kbit/s signal. The range can be up to 300 m if there is a clear line of sight.

Mobile phones

A mobile phone, in contrast to cordless phones, is based on an underlying mobile network, which increases the range of operation to the area covered by the mobile network. There have been several regional variants of mobile networks in operation in the 1970s and 1980s until the Global System for Mobile Communications – **GSM** – was introduced in the early nineties. There are currently about 650 million mobile users world-wide using a GSM terminal. The GSM standard uses the radio spectrum around 900, 1800 or 1900 MHz in a licensed band. Due to the scarcity of bandwidth, the designers of the GSM standard allowed only 13 kbit/s for speech transmission, which leads to a noticeable reduction of the voice quality in GSM phone calls compared to fixed line telephones. Data transmission in GSM is limited to 9.6 kbit/s only.

As a bit rate of 9.6 kbit/s is far too slow for most of the current data services, an extension to the GSM standard was defined, the General Packet Radio Service – **GPRS**. Existing GSM networks can be upgraded to GPRS, which reduces the costs for its introduction, but it also requires a new GPRS-capable terminal. The GPRS standard in theory allows a transmission of up to 171 kbit/s, but current networks and terminals in practice allow not more than 50 kbit/s for receiving and 13,4 kbit/s for sending data. A more essential new aspect of GPRS is probably the fact that data is sent in packets, and the pricing can be based on the number of transmitted data. Thus a GPRS telephone can always be 'online' without causing any costs as long as no data service is used. Most of all WAP users are likely to profit from this effect. Faster download and lower costs may allow a breakthrough for WAP services. Most of the European GSM networks have already been upgraded to GPRS, but availability of only very few models of GPRS telephones and missing roaming agreements between GPRS operators have impeded broad use of this technology by now. What many don't know: GPRS has laid the basis for UMTS, as the UMTS core network is based on GPRS.

Towards UMTS

Even before the deployment of GPRS networks had started, another extension to GSM networks had been standardised to further increase the transmission speed: EDGE – Enhanced Data for GSM Evolution. By an enhancement of the radio interface, speeds of up to 384 kbit/s allow data services and applications to exchange data at 6 times the speed of an ISDN channel. The efforts for the introduction of EDGE are like with GPRS still relatively low, as existing GSM networks can be upgraded and new terminals will be needed, but no new license like with UMTS is required. As the transmission rate compares with the full-coverage bandwidth of UMTS, EDGE might be the technology of choice for all network operators that were not successful in achieving a licence for UMTS. The reason that EDGE hasn't taken off by now can be seen in the still ongoing introduction of GPRS and probably has a political reason as well, as operators are focussing on the introduction of UMTS. In spite of UMTS, many users could benefit from an introduction of EDGE: As UMTS in the beginning will be available only in larger

urban areas, users in rural areas would benefit from the immediate full availability of EDGE, allowing the use of high-speed UMTS like services.

With **UMTS** two new access technologies will be used in Europe: The Wideband Code Division Multiple Access (W-

CDMA) and Time Division CDMA (TD-CDMA). UMTS uses radio bands at around 1900 – 2000 MHz and 2100 – 2200 MHz. It allows a maximum data rate of 2 Mbit/s in hot spots and 384 kbit/s for full coverage. This will allow a whole set of new services. Although manufacturers and operators are still struggling with developing handsets and setting up networks, the key for the success of UMTS will lie in the provision of a great variety of customer driven, easy-to-use and affordable services.

Wireless access for data terminals

While the technologies described above mainly focus on voice terminals, there have also several standards been defined to enable wireless access for data terminals like PCs or notebooks. In 1997 IEEE finished the definition of the Wireless Local Area Network – **WLAN** – standard **802.11**, and in 1999 standards 802.11a and 802.11b have been approved. 802.11b has spread quickly and has already been widely deployed in company networks, but became, due to the decreasing prices, also an option for home users. 802.11b, also referred to as 'WiFi', operates in the license free 2.4 GHz band, allows 11 Mbit/s data speed and a range of up to 300 m. There are various application fields, like the easy and comfortable setup of an Adhoc network, or simply the individual mobility of employees in their company or home users in their home. The use of 802.11b for offering Internet access to guests and customers in hot spots like hotels, coffee shops or airport lounges has triggered a discussion about its capabilities to offer UMTS type of services, taking away part of the UMTS business or even making UMTS obsolete. In this respect it has to be kept in mind that 802.11b is rather a wireless access standard than a full mobile network specification with Quality of Service, charging mechanisms and sufficient security, although WLAN might be an option to complement UMTS at so called hot spots.

Further standards like IEEE **802.11a** or the ETSI standard **Hiperlan/2**, enabling data rates of up to 54 Mbit/s, are waiting for their take-off. Both operate at around 5 GHz and can in fact be seen as competing technologies. Hiperlan/2 technology seems to be more advanced than 802.11a, as it allows for power management and dynamic frequency change in case of interference, features, which are currently not defined in 802.11a. The outcome is however not clear yet, but first products for the European market are still expected for 2002.

Getting rid of more cables

Although all the above technologies go along with a cableless connection of terminals and devices, one more standard

has been defined with the primary goal of replacing cables between any device: the **Bluetooth** standard. With a range of 0.1 - 10 m Bluetooth is intended to replace cables for all connections of PCs or notebooks and periphery like printers, mobile phones or a digital camera, but also between a mobile phone and a headset, just to name a few examples. The standardisation of **Bluetooth** was finished in 2001, finally solving the interference problems with 802.11b devices. First Bluetooth devices are now emerging on the market. Bluetooth allows up to 721 kbit/s in asynchronous mode (57.6 kbit/s in the other direction) or 432.6 kbit/s in synchronous mode. In power class 1 range can be even up to 100 m, which can put Bluetooth into some competition with 802.11 devices, for which the lower data rates and range is uncritical. This is, for example, the case for a ISDN connection for Internet access of home user PCs, but also the provision of Internet access in hot spots like described with 802.11b is possible.

Long distance wireless access

Finally another type of wireless access technology shall be briefly mentioned: Hiperaccess – the high performance radio access. Hiperaccess is an immobile, wireless access network and can be seen as a wireless alternative to fixed line high-bandwidth access networks implemented with fibre cables. It achieves 25 Mbit/s and can be used to connect to company buildings or residential areas. Hiperaccess operates at 40/43 GHz, and the range is up to 5 km. As such it allows the creation of an access network without the need of digging cables.

Conclusion

There are much more wireless technologies, which, however, couldn't be covered in this brief tutorial. For more information on the described technologies the reader is referred to the links given in the table.

Technology	Standardisation	Frequency	Data rate	Range	Typical usage	Link
DECT	ETSI EP DECT	1,8 GHz	552 kbit/s, up to 2 Mbit/s	300 m	cordless phones, local loop	www.etsi.org/dect
GSM	ETSI SMG	0.9 / 1.8 / 1.9 GHz	13 kbit/s for voice, 9.6 kbit/s for data	max 30..50 km to next base station	voice and data, WAP	www.gsmworld.com
GPRS	ETSI SMG	see GSM	171 kbit/s	see GSM, less for max. data rates	data services, WAP	www.gsmworld.com
EDGE	3GPP GERAN	see GSM	384 kbit/s	see GSM, less for max. data rates	data services, 3G systems in the U.S.	www.gsmworld.com
UMTS (WCDMA, TD-CDMA)	3GPP	1.90..1.98, 2.01..2.025, 2.11..2.17 GHz	144, 384 kbit/s, 2 Mbit/s	depending on number of users in cel	voice, data, multimedia services	www.3gpp.org
802.11b	IEEE	2.4 GHz	11 Mbit/s	150 m	WLAN	standards.ieee.org
802.11a	IEEE	5.15 GHz	54 Mbit/s	150 m	WLAN	standards.ieee.org
Hiperlan/2	ETSI BRAN	5.2 GHz (in 4 and 5 GHz band licensed)	54 Mbit/s	30..200 m	WLAN, local access to ATM	www.etsi.org/bran www.hiperlan2.com
Bluetooth	Bluetooth SIG	2.4 GHz	721 kbit/s	0.1 .. 10 .. 100 m	periphery devices	www.bluetooth.com
Hiperaccess	ETSI BRAN	40.5 / 43.5 GHz	25 Mbit/s	5 km	remote access to IP / ATM	www.etsi.org/bran

Table: Wireless technologies

NEW EURESCOM PROJECTS KICKED OFF

Despite the difficult business situation the telecommunications industry currently has to face, we obtained an amazing number of high quality project proposals for our EURESCOM Work Programme 2002. We have roughly 30 proposals in our basket, which we will gradually start as EURESCOM projects, or which we try to transfer into European Community research projects. The current re-structuring process at EURESCOM has delayed the start of a number of new projects. Nevertheless, we have managed to get five new challenging EURESCOM projects on their way.

The Telcos' Vision of Systems Beyond 3G (P1203)

A system beyond 3G will become quite complex and touch all aspects, e.g. user preferences, system requirements, system specifications, network architecture, security architecture, and mobile agents. The project will act as an umbrella, collecting ideas on technical issues from other EURESCOM studies. In addition, the potential of systems beyond 3G in terms of market and technolgy will be analysed. The anticipated complexity and modularity of the systems will allow for new business models, which will be investigated. This complexity will also imply a potential gain in terms of cost effectiveness by convergence of technologies at various levels.

The outcome of this project will be a common opinion on all aspects of 'Beyond 3G'. The contributions towards research, standardisation and conferences will be based on this common opinion, and thus directed to ensure a system design, which satisfies customer needs and maintains the Telcos' interest. The added value implied by the project is to give operators background knowledge to make strategic decisions regarding operation of systems beyond 3G.

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Mobile Presence (P1204)

The goal of the "Mobile Presence" project is to investigate new types of services related to location-based services. Those new services will start from instant person-to-person communication services like SMS and Instant Messaging (IM) by integrating information about the current availability state of users and about their location, as will be provided by the new generation of mobile networks (3G).

There are numerous highly attractive potential applications. Some of these include: Users tracking the positions of other – consenting – users, which will be helpful for businesses and families. Users could form communities of friends, colleagues or professional groups and be alerted if other group members are available and happen to be in the vicinity. Users could specify personality profiles and personal interests to initiate contact with like-minded users at specific locations. Users could also receive informational and promotional contents tailored to their current position. The focus is on investigating and developing applications that offer most benefit for the users. More specifically, this project will explore marketable usage scenarios, design the most appropriate service frameworks for them, extend an existing IM platform with location-based functionality, and implement a service prototype.

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ERNIE – Entertainment and new interactive services via DSL (P1201)

The transmission of broadband entertainment services (like traditional TV and upcoming Interactive TV services) via DSL access networks will be a hot topic, having in mind the desired separation of cable operators from Telcos. In the framework of this project, the feasibility of provisioning TV and iTV services via IP-based networks (especially over xDSL access) will be examined and demonstrated.

The project will choose a user-centric approach focussing on acceptability and quality aspects compared to traditional DVB-based or analog TV services. Customer requirements will be collected and assessed. These requirements will form the basis for the concept of a showcase demonstrator. This demonstrator will prove the feasibility of TV via DSL as well as current limitations. An in-depth study and comparison of available codecs, DSL-STB implementations and middleware will be carried out. Interviews with users and an extensive market analysis will give answers on the expected economic success and user acceptance of TV via DSL. The project will examine and evaluate the mass-market suitability as well as the economic perspectives.

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Identity and ICTs – Analysis and Implications for Service Design (P1205)

Europeans have a multiplicity of different identities they want to create, support and communicate. The more mobile people get, the more complex their social relations become, and the more they use communication technologies to create, support, and possibly transmit their identities. People build and maintain more and more relationships through digital applications and devices, e.g. e-mail, mobile phones, Internet and SMS messaging have all very important social functions to large groups of people.

This project will investigate the importance of identity and roles in the adoption and use of information communication technology (ICT) by individuals. It will focus particularly on how individuals manage their identity with particular reference to the mobile market as mobile phones are tied with identity due to the nature of individual ownership and the potential for personalisation.

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Routing in Translucent Optical Transport Networks (P1202)

The focus of the translucent transport network concept is to support the formation of large, national or even pan-European wide transparent optical domains, in which optical links are connected by optical cross-connects. The size of such large transparent optical domains is limited by physical effects, like amplifier noise, fibre dispersion, non-linearity and cross-talk that accumulate along long routes and have to be taken into account in the routing protocols. In this project, a concept for including physical limitations in the routing protocol in translucent transport networks will be developed. The new concept will be investigated experimentally in a reference network in co-operation with different vendors.

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NEXT GENERATION NETWORKS ROADMAP 2002

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Today only 5 per cent of the global society are on-line and have access to Internet services. It is a goal of the European Community to enable a much higher proportion of the global population to become active members in the information society. Besides political, economical, regulatory and human behaviour reasons, there are technical, and research and development issues, which must be overcome on the way towards this goal. In January 2000, the European Community IST Research Programme launched the "Next Generation Network Initiative" (NGNi), a so-called "Thematic Network" project to resolve issues that create barriers to NGN deployment and to achieve interoperability, compatibility and/or commonality between NGN related projects within the IST Programme.

A big step forward in the direction of solving next generation network issues was achieved during the two NGNi meetings on 13 and 14 February in Brussels.

The objective of the first day's meeting was co-ordination of the relevant IST projects (in the IST programme called "concertation"). This is a very important activity to achieve the maximum synergy between the IST projects involved in next generation networks matters. There is a large number of next generation network related IST projects; about 30 of them were either present or represented, enabling an important first step to be achieved towards good co-ordination. The broad areas, in which the next generation network fields were structured, were "Next generation IP protocols", "Network Management", "Fixed/mobile integration", and "Access networks".

The second day was the NGNi members meeting. The objective was to monitor the progress of the ongoing 6 NGNi activities, discuss 3 new proposed activities and agree on the way ahead.

Bottom-up: laying the technical foundation

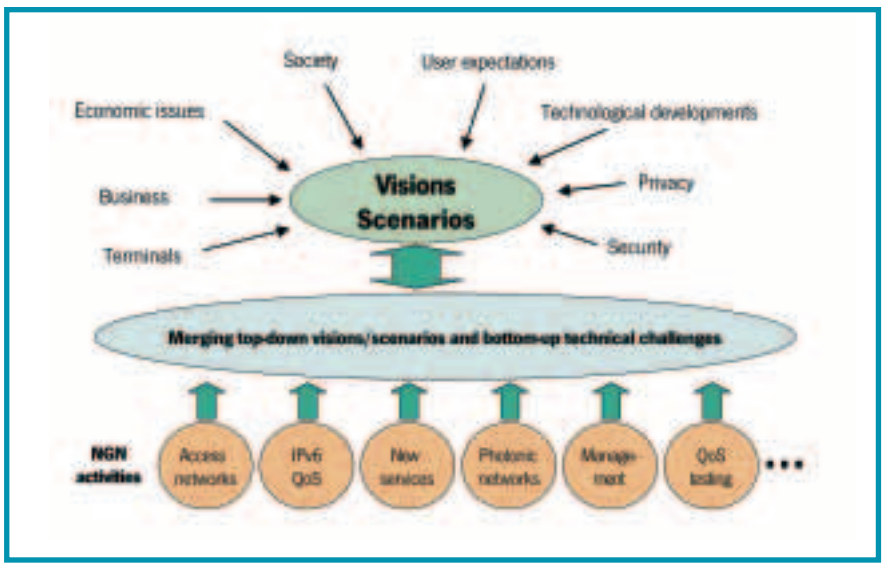
The work performed in the NGNi project so far has concentrated on the technical challenges of specific network related areas. The instrument chosen for this are so-called "NGNi activities", short and small mini-projects funded within NGNi, which have the objectives of developing technology benchmarks, technology roadmaps and identifying required contributions to standards activities. NGNi activities have started on the following items:

- Future directions and trends in access technologies
- IPv6 Quality of Service (including a searchable meta-database containing more than 5,000 Quality of Service related documents).
- New mobile services in NGN (focussing on providing uninterrupted roaming services)
- Next generation photonic core and metro networks
- Management (including network management trends, inter-domain and content management)
- Interoperability and QoS testing (including the provision of IPv6 test suites)

Three new NGNi activities were proposed:

- Voice over IP
- Next generation service platforms
- IPv6 deployment issues

During the follow-up discussion it was realised that it is important to identify and collect the technical issues. But it was also accepted that this bottom-up view can only include a limited set of the most important items and can never provide the full picture. It would be impossible to lay the complete puzzle with this approach. Therefore, a parallel top-down approach is required, which looks at the issue from a much more general perspective.



Top-down – producing visions and scenarios

To do this, an overall NGN vision and scenarios are needed. This vision and the scenarios should be consistent with the broader vision of the information society, its constituent individuals, economic and market aspects. They should also take into account and explain the business motivations.

Between these two processes (bottom-up and top-down), the technical issues and challenges will merge with the developed visions and scenarios, and provide the required NGN roadmaps. It will be a challenging but also rewarding task to achieve a coherent framework including visions, scenarios, roadmaps and unsolved technical issues.

Laying the foundations – together

The results of NGNi will be used, together with inputs coming from other sources, as a guide to identify the European network related research issues of the next decade. It is important for the European Commission to put the available money on promising subjects and not to waste it by supporting activities that are not in line with future telecommunications trends. For defining the 6th Framework Programme and for creating a European Research Area, we need concise roadmaps of the future information society and the related information and communication technologies. We need to clearly identify the items, which need urgent R&D measures to fill the gaps towards accepted ICT services. EURESCOM is heavily supporting this initiative and is ready to take an active role in defining Europe's way towards the information society.

More information about NGNi and the results achieved so far is available on their Web site at: http://www.ngni.org

new project results

Studies

P1146 **Getting online communities to develop**
Deliverable 1 – Success factors of online business communities – (EURESCOM confidential)

P1146 **Getting online communities to develop**
Deliverable 2 (Technical Information) – Success factors of online business communities – background information and individual reports – (EURESCOM confidential)

P1150 **E-voting – Opportunities and challenges for network operators**
Deliverable 1 – E-voting scenarios, requirements, implications and solutions (premature version) – (EURESCOM confidential)

P1150 **E-voting – Opportunities and challenges for network operators**
Deliverable 2 – Investigate e-voting services and scenarios from a network operator's perspective (premature version) – (EURESCOM confidential)

Applications and Services

P1002 **Technologies and Architectures for a Leap in Multimedia Databases (TALMUD)**
Deliverable 3 (Technical Information) – Storage, retrieval and filtering architecture – additional technical information and revised modules – (For full publication)

P1002 **Technologies and Architectures for a Leap in Multimedia Databases (TALMUD)**
Deliverable 4 (Technical information) – Implementation of a MM Storage, Retrieval and Filtering Platform – (For full publication)

P1101 **Always-On "Device Unified Services"**
Deliverable 1 – New Service Definitions for AO Networks – (For full publication)

P1101 **Always-On "Heterogeneous Services"**
Deliverable 2 – How to build the next generation telecom infrastructure – (EURESCOM confidential)

P1102 **Mobile electronic commerce (eMporio)**
Deliverable 1 – Service scenarios for m-commerce – (EURESCOM confidential)

P1102 **Mobile electronic commerce (eMporio)**
Technical Information 1 – Mobile payment methods for M-Commerce – (EURESCOM confidential)

P1103 **Inter-Operator IP QoS Framework -ToIP and UMTS Case Studies**
Technical Information 1 – Review of existing IP QoS activities and extension of P1008 findings – (For full publication)

P1104 **Multimodal multilingual information services for small mobile terminals (MUST)**
Deliverable 1 – Multimodal Services – a MUST for UMTS – (For full publication)

Middleware

P925 **Internet Middleware (for customised service bundling)**
Deliverable 5 – Report on Technology Support for Interactive Multimedia Services – (EURESCOM confidential)

P1005 **Jini & friends @ work – Towards secured service access**
Deliverable 10 – Experiences and conclusions – (For full publication)

P1108 **Work-flow based On-line Validation of Complex Component Based Internet Services**
Deliverable 1 – Requirements for Continual On-line Validation – (EURESCOM confidential)

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E-MAIL FROM MARS

PLANS FOR AN INTERPLANETARY INTERNET ARE TAKING SHAPE

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If you plan to spend your next vacation on Mars, you currently face two problems: Getting there and sending e-mails with attached snapshots to your relatives and friends. At least the second problem will soon be solved.

In 1998 Vinton G. Cerf came up with his vision of an Interplanetary Internet (IPN). In May 2001 the IPN Research Group, led by him and NASA scientists, presented an architectural definition.

Obstacles in outer space

Internet in outer space is confronted with a lot more obstacles than on Earth. Radio signal delays, shortage of bandwidth, limited power supply, interrupted connections and increased security problems require new techniques and more patience. Most obvious is the sheer distance. It can take 20 minutes for a signal from a base station on Earth to reach an orbiter on Mars.

First deployment in 2004

As a first practical step towards the implementation of an interplantary Internet, NASA will use a new protocol for file transfer across interplanetary distances, called CFDP, on its Deep Impact comet mission, which is scheduled for 2004. In addition, NASA is planning to deploy a 'Mars network' of multiple orbiting relay satellites, intended to be launched in the years 2005 following.

Future prospects

However, building up a stable backbone of satellites in outer space for the interplanetary Internet will take some time. Even Vint Cerf doesn't expect this to happen sooner than 2040. IPNSIG chairman Scott Burleigh sees at least a good chance that the Interplanetary Internet will be a fact of life in deep space robot operations by 2020 (see the interview). Both expect that IPN will sooner or later be used for commercial services. But what the business opportunities could be is still open.

FULLY FUNCTIONAL INTERPLANETARY INTERNET BY 2004

Interview with Scott Burleigh, chairman of the IPN Special Interest Group and senior software engineer at NASA's Jet Propulsion Laboratory, about challenges and prospects of the Interplantery Internet (IPN).

Why do we need the Internet for interplanetary communication?
In the very near term the techniques we've been using for the past decade will work fine. But NASA is starting to plan for missions whose communication needs will be quite a lot more complex. For example, there may be multiple rovers and/or base stations on the surface of Mars. These devices will be too far away for efficient micro-management by people, so their communications will have to be conducted by automated protocols. The most successful model for standardised, automated communication among a large population of entities is the Internet protocol suite.

What are the main differences between Internet on earth and in outer space?
The major differences show up when you look at the 'long haul' communication between Earth and, say, a Mars orbiter. The endpoints of communication are so far away that it takes a radio signal 4 to 20 minutes to travel from one to the other. What's worse, much of the time the orbiter is on the other side of Mars; a signal we send to Mars might arrive just as the orbiter is going out of sight.

How can you achieve security over the Interplanetary Net?
Security measures are being designed into the IPN protocols right from the start. We plan to rely on mechanisms that are already used for secure communication over radio on Earth, particularly symmetric and asymmetric key encryption.

What are the next steps towards IPN?
We've begun developing an initial prototype of the "bundle" protocol suite; we hope it will give us something to demonstrate eighteen months or so from now. At the same time, a new protocol for file transfer across interplanetary distances, called CFDP, is just now being adopted as an international standard. The initial flight deployment of CFDP will be on the Deep Impact comet mission, which is scheduled to launch in 2004.

How do you estimate the chances for commercial services via IPN?
Commercial IPN service is likely to become available as soon as there's a market for it, which will probably be at about the same time that we start to see private business operations in deep space. That will probably not happen until the cost of getting into and operating in deep space comes down, and maybe the IPN will help make that happen.

When do you expect the Interplanetary Internet to be fully functional?
As soon as there are enough functioning robots in deep space to make it indispensable. Probably not by the end of this decade, but I think there's a good chance that the IPN will be a fact of life in deep space robot operations by, say, 2020.

The interview was conducted by Milon Gupta.

See the complete interview, links and further information at www.eurescom.de/message

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21 to 24 October 2002 in Heidelberg, Germany
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Powerful networks for profitable services

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The EURESCOM Summit 2002 aims at bringing together the technology research community, the experts of telecommunication networks, services and products as well as leading telecommunications business personalities to share ideas and develop a common vision.
The conference is primarily focusing on advanced network issues, and emerging network services and architectures. To include the business aspect, it will also address application services, terminals, users and business cases that include the network dimension. It is a comprehensive industry, technology and business event.

EXHIBITION – EXPERTS MEET EXPERTS

The conference will also host an exhibition where experts can meet experts and explore available and emerging products, devices and tools that support the building of powerful networks of the future. Please send requests for exhibition space to summit2002@eurescom.de

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Data communications experts, network technology specialists, systems engineers, telecommunication architects, business and product planners, application and service developers, product developers, visionaries, strategists, researchers, executives from: Network operators, service providers, IT vendors, content providers, manufacturers of IT/ telecom software/ hardware, application service providers, academia and consultant companies.

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A conference programme will be available and distributed in June after the best papers will have been selected by the Technical Programme Committee.

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