Issue 3/2000

EURESCOM mess@ge

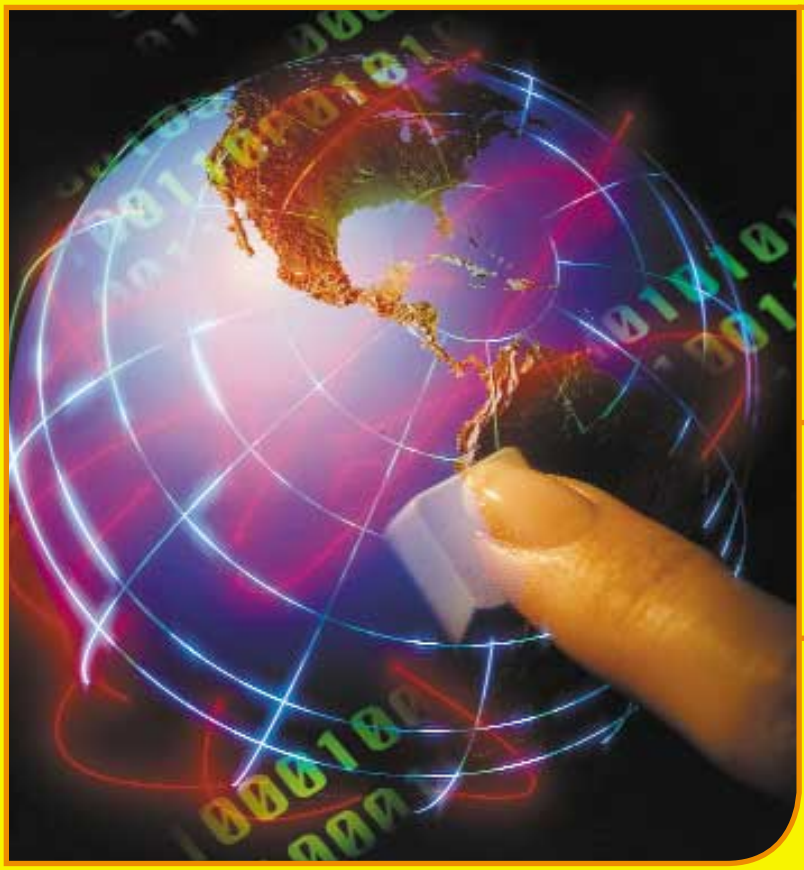
# Cashing in on EURESCOM results

- Analysis of telecommunications investment projects
- Market data on the use of ICT
- Security for m-commerce
- Intelligent fraud detection saves money

- Telecommunications market Yugoslavia
- Tutorial: UMTS

# AIMS 2000

## Applied IP and Multimedia Services



**Cutting edge topics of future IP applications and multimedia services**

- Multilingual Web sites
- Portals
- Advanced conferencing systems
- Smart devices
- Always On concepts
- Quality of service in IP networks
- Management of multimedia contents
- IPv6
- Realcast

**Who will be there?**

- Network and service planners at TelCos and Internet Service Providers
- Experts on service creation, usability and organisational issues

**Contributions from:**

- EURESCOM projects
- ETSI projects
- IST projects
- KPN Research
- NEC

**For further information and registration please visit our Web site under:**

http://www.eurescom.de/public/events/Aims2000/aims2000.asp
Please notice that registration is recommended via the Web.
Deadline for registration is 13th October 2000.
Participation is free.

Venue:

EURESCOM
Heidelberg

Conference:

25 and 26 October

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# The value of EURESCOM and collaborative R&D

Dr. Claudio Carrelli
Director of EURESCOM

Globalisation and competition are governing the telecommunications arena more and more. Shareholder value is becoming the dominant factor in the new economy. It is therefore fair to ask what value EURESCOM offers to its shareholders.

The old model of R&D as the search for the ultimate truth does not apply any more. Scientists are no longer the priests guarding the temple of knowledge, seeking new knowledge, whose discovery would guarantee honour and prestige.

Research is now to be seen as the key to innovation; and innovation, no matter whether it is in technology, services or procedures, is the key to survival in the present age. Scientists are overrun by commercial developments, and future visions are more and more formulated by entrepreneurs rather than by scientists themselves. The effect of this commercialisation is that competition is no longer in the field of research, but in the fields of markets, products, customers and 'time to market'. We are facing a new 'gold rush' age and the competition is to find the 'gold' first. Once it is found, it should immediately be taken and lodged in the bank to improve our profits and share prices.

Is there still a role in such a competitive commercial scenario for collaborative R&D? Will collaborative R&D really provide value to EURESCOM shareholders?

In preparation of this issue we considered such questions and we looked into the concrete value of our existing joint research projects. We found a lot of examples, where our project results are of great use to the shareholders, and offer promising business perspectives. You will find some of them highlighted in this issue and you can discover the effective value of our results.

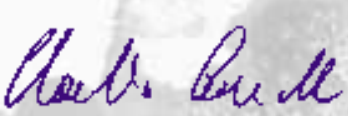
It is, nevertheless, important to differentiate between results you can immediately exploit and exciting, potentially profitable results, which require shareholder actions to be brought to the market. EURESCOM offers a great number of potentially profitable results but only a few can be immediately translated into revenue producing services. This is due to the very nature of the projects EURESCOM manages for its shareholders. EURESCOM projects are mainly applied research with a time to market impact of 12 to 24 months. Whether a certain technology, specified and improved by EURESCOM, turns out to be a commercial success depends on the cleverness of our shareholders' implementation departments to convert the acquired knowledge into profitable services.

Let us extend the previous metaphor: EURESCOM is neither a temple where the priests research the truth, nor an uncontrolled rush of gold diggers. EURESCOM has Europe's best cartographers and toolmakers jointly drawing maps to gold mines and delivering customised equipment for extracting the gold. However, the actual digging up of the gold has to be done by each EURESCOM shareholder himself. Every shareholder can use at least some of the maps and equipment provided by EURESCOM and some can use all of them. Wise gold miners know that having the right map can be more profitable in the long run than random digging at well-known places.

In the gold rush for innovative network and telecommunications services, EURESCOM maps of innovative networks and services can mean the difference between running behind the crowd or leading the market.

UMTS provides a good example of a new age gold rush. The licences in Europe are being sold for incredible amounts of money and the race is now on to produce the innovative services and the cost-effective networks that will give a satisfactory return on this investment. This is where EURESCOM comes in. The collaborative effort to draw the right maps gives a strong acceleration to the progress of exploiting the new discovery of 'gold'. Right now several EURESCOM projects are running, and more are being planned, that provide urgently needed information on how to design UMTS networks and which services to develop and offer via UMTS.

A last remark: working together, on the basics of the UMTS future, gives a greater probability of success. In addition to the benefit of collaboration, it allows some of the scarce and precious human resources in our shareholder companies more room to dedicate their time to work on their competitive advantage.



# Editorial remark

Dealing with so much innovation every day, it is only consequent that we introduce some innovation concerning layout and structure of *mess@ge* in this issue in order to increase the user-friendliness and appearance of this magazine. Especially, we are introducing two new sections: 'mess@ge to the editor' and 'A bit beyond', the latter adding some entertainment. We hope you like it. In any case we would be happy about your feedback. If you do not have time to write a message, you can just fill in our short Web questionnaire* and thus help us with the further tailoring of *mess@ge* to your information needs.

There is also a change in the editorial board. Three new members have joined the editorial team of mess@ge magazine: Anastasius Gavras (project supervisor), Milon Gupta (public relations officer) and Manuela Baker-Kriebel (publications secretary).

In a concerted effort with the experienced team members, Peter Stollenmayer and Magnus Krampell, our new quintet will strike the right note, informing you about the latest developments in telecommunications, the IT world and EURESCOM's role in shaping the future.

Your mess@ge editorial team

* See our Web site under http://www.eurescom.de/public/publications/ms 29/questionnaire.htm

# mess@ge to the editor

Dear reader,
You are probably wondering, why we are writing a letter to you, when you would expect to see letters from other readers to the editor under this section. There is a simple explanation for this. Up to this issue we had neither this section nor the letters needed to infuse life into it. Now we have this section, but no letters.

**Why do we seek messages to the editor?**
There are several reasons, why the editorial board decided to introduce this section. Here are the two most important: Firstly, we would like to give the readers a forum, where they can discuss the magazines' topics. Secondly, we would like to get to know your opinion on the articles that are published in *mess@ge*.

**Who can write a message to the mess@ge?**
Everybody who is interested, especially employees from our shareholder companies. It is no prerequisite to be a EURESCOM insider. Every comment, criticism or information is welcome, whether by e-mail (preferred), letter or fax.
Our space for your messages is limited to this single page. We therefore recommend to be concise and strictly to the point.

If there is a need on your side, we could additionally install an Internet News Group for the discussion of current *mess@ge* topics.
Now it is your turn, dear reader, to write to us.

Your *mess@ge* editorial team

Please send your messages to:

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**Fax: +49 6221 989-209**
**EURESCOM GmbH**
**Schloss-Wolfsbrunnenweg 35**
**D-69118 Heidelberg, Germany**

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# Japanese parliament delegation at EURESCOM

Members of the Diet communications committee and their hosts from EURESCOM visiting Heidelberg Castle. In the middle Mr Tadamasa Kodaira next to Dr. Claudio Carrelli.

On 27th August a delegation of the Japanese parliament visited EURESCOM on their information trip to Europe. The delegation consisted of four members of the Diet communications committee and three accompanying officials from the House of Representatives, the Ministry of Post and Telecommunications and from Japan Broadcasting Corporation.

The leader of the delegation, Mr Tadamasa Kodaira, expressed the committee's high interest in EURESCOM, acknowledging that this model of collaborative research is unique worldwide. In his presentation Dr. Carrelli, Director of EURESCOM, explained the current situation of telecommunications in Europe and the advantages of collaborative research. He stressed that EURESCOM is a virtual company, which organises over 40 projects containing 3,000 man months in the most efficient and cost-saving way.

The special interest of the Japanese guests was aroused, when Dr. Carrelli announced the openness of the organisation for new shareholders, which might soon be extended to non-European operators and providers. In the case of Japan talks had already taken place in the past with NTT.

A second major topic of discussion was UMTS. The Japanese, who had already visited the German Regulatory Authority on Telecommunications and Post in Mainz, were amazed by the high prices paid in the German auction. Dr. Carrelli pointed out that adequate returns would be possible with new services that meet market demand. This is already a subject of current EURESCOM research. Dr. Carrelli identified m-commerce, remote diagnostics and localisation as important fields for services to be developed.

After the discussion, the delegation visited Heidelberg Castle and the old town centre of Heidelberg. Before coming to Germany the Japanese had already been to Finland and Britain. The Diet communications committee issues law proposals on broadcasting and telecommunications, and pushes developments of the IT sector in Japan.

## Project meeting at Iceland Telecom

When the EURESCOM project P904, dealing with the impacts of telework on the quality of life had its project meeting in Reykjavik in July, it took the opportunity to inform Iceland Telecom colleagues about the benefits of the results of this project. More than 20 managers of business and technical units of Iceland Telecom attended this ad hoc 'mini seminar', asked many interesting questions and participated in a lively discussion.

## Workshops and conferences

### IST'2000 conference

The IST'2000 conference, which will be held in Nice on 6-8 November, will feature a session called: 'IPv6: An opportunity for Europe'.

EURESCOM has been invited to present work done in our projects on the IPv6 theme. Among the speakers in this session are: Vint Cerf (MCI) and Christian Huitema (Microsoft).

More information can be found at:

**http://istevent.cec.eu.int/**

### Hybrid Network Services & Products (HNSP' 2000)

EURESCOM projects P909 & P916 have interesting results to share on hybrid networks and on the usage of open APIs both from architectural and implementation aspects.

An overview of emerging standards protocols and APIs (e.g. Parlay, JAIN, IETF -PINT & SPIRITS) will prelude to the description of the architecture and its most relevant components, while live demonstrations will provide an overview of enabled services.

At this conference on 15-16 November in Heidelberg, 15 speakers from industry are also invited to present upcoming products for IN-Internet Integration as well as for Next Generation Networks along with their view on ongoing standardisation initiatives.

### Joint Workshop IST Project OPTIMIST and EURESCOM Project P918

EURESCOM Project P918 'Integration of IP over optical networks: Networking and Management' presented some of its results on a joint workshop together with IST Project OPTIMIST. The workshop on 'The Optical layer for Datanetworking' on 3rd September was held in conjunction with ECOC2000 in Munich, Germany.

### AIMS 2000 – Applied IP and Multimedia Services

Stepping up from previous year's AIMS Workshops the AIMS 2000 Workshop in Heidelberg (25-26 October) will concentrate on IP services and networks and will look at the applicability of research results. At the workshop a total of 24 presentations will discuss results from various EURESCOM, IST and ETSI projects. Presented topics are, among others, QoS for end-to-end services in multi-provider scenarios, deployment of DiffServ, MPLS and IPv6, services from VoIP, Multicast and Always-On, multimedia content management and advanced multimedia services.

# Cashing in on EURESCOM results

Value for money, return on investment, business plans and other economic considerations are prerequisites for all activities where money is being spent wisely. This issue of EURESCOM mess@ge concentrates on the value of our project results for our shareholders.

## The secret of collaborating competitors

As our director suggests in his introduction to this mess@ge, the results of EURESCOM projects are in most cases not immediately cashable. This is wanted and due to the fact that EURESCOM performs mainly pre-competitive research for its shareholders. This does not mean that EURESCOM project results have no value in money terms, it just means that the shareholders have to do some additional work in their development departments to make the final steps for a 'sellable' service or product. This is necessary and sensible because our shareholders are not only 'sitting in the same boat', but also are heavy competitors. Through making the final steps themselves, they can give the products or services their flavours and hence provide competitive offers to their customers.

## Where are the gold mines?

About 40 to 50 different EURESCOM projects run in parallel. We can of course not report on all of them in one issue of our mess@ge. Therefore we have concentrated on about half a dozen projects which we think are of major interest to our shareholders in terms of using the results for making money.

## How to optimise your investment projects

Our project 'Extended investment analysis of telecommunication operator strategies' (P901) has been concentrating on how to evaluate telecommunications investment projects. The project has proposed different tools and methodologies to calculate such investment projects. The objectives are to assess the return on investment and the risks, and to identify alternative, more optimal ways to invest.

## Why do people use or not use ICT?

For a telco this question can decide on success or failure. Our project P903 on 'Cross cultural attitude to ICT in everyday life' is undertaking a big international survey in order to collect market data on the use and non-use of ICT. The project team will analyse the data to find out why people use or do not use ICT and what telco can do to increase their customer base.

## New results on broadband access networks

BOBAN (Building and Operating Broadband Access Networks, P917) is currently the largest EURESCOM project. It looks at different aspects of broadband access networks, one of the core domains of telcos. A lot of money is being invested in access networks and it is therefore important to both invest in the right, future proof technology and to invest in the economically optimal way.

## Improving the efficiency of IP transport networks

With the help of the results of the EURESCOM project on 'Integration of IP over optical networks' (P918) EURESCOM shareholders can improve the efficiency of IP transport in their backbone networks and compete more successfully with the new operators adopting the latest technology.

## Security solutions – a vital topic

One of the critical issues for the uptake of electronic and mobile commerce on a global scale is the provision of reliable interoperable international security systems. Our project P1001 (Public Key Infrastructure Implementation and Test Suites for Selected Applications and Services) provides solutions including interoperability testing on a European scale.

## WebSim can boost your business

Our project 'Jini & Friends @ Work' (P1005) is looking at possibilities of using the smart card (SIM) which is included in every GSM phone for providing value added services. One of the first delivered prototypes is the so-called WebSIM, an implementation of a stripped-down Web server inside a GSM SIM, based on the SIM Application Toolkit platform (SIM AT). The WebSIM is now in a small field trial among P1005 partners to study and demonstrate possible applications of the WebSIM approach: in particular the domain of mobile commerce security and SIM-based authentication initiated from the Internet are considered. By using those results, our shareholders can very economically provide a service platform available in millions of GSM phones.

## Fighting fraud can save millions

We know from the United States that fraud costs the telcos billions of dollars every year. Our project P1007 (Application of Intelligent Techniques to Telecommunications Fraud Detection) which started not so long ago will look at intelligent techniques to detect fraud. If our shareholders will use those techniques, we expect that they can save millions through better ways of detecting and hence fighting fraud.

**Peter Stollenmayer, EURESCOM**

# Analysis of telecommunications investment projects

Leif-Aarthun Ims
Telenor AS

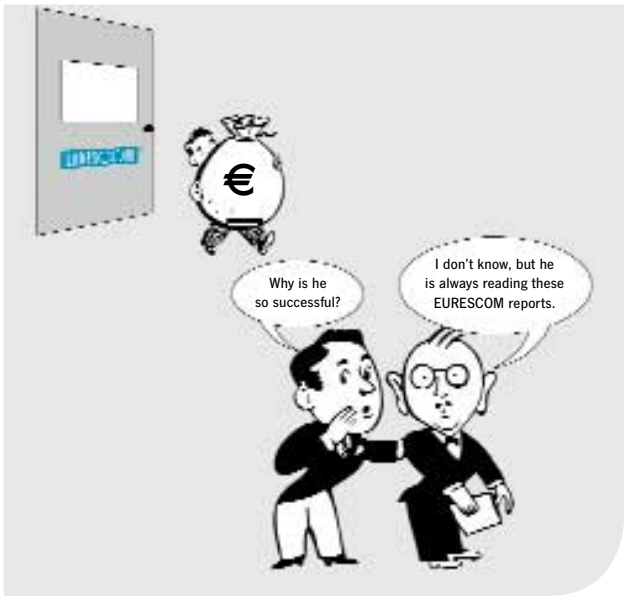
Peter Stollenmayer
EURESCOM

The rapidly increasing competition in the telecommunications market forces the telecommunication operators to minimise costs and to maximise the return on investment. Provisioning of new, advanced services through the introduction of modern technology is commonly expected to be a crucial prerequisite as the operators position themselves for the future service battle.

The EURESCOM project P901 concentrates on evaluating telecommunications investment projects. The main focus lies on quantitative analyses, relying on the establishment and use of a common assessment framework, including common models for costing, market assessment, competitor behaviour and risk analysis.

The major contribution from the project is a recommendation on methodologies and tools enabling a harmonised evaluation of different types of telecommunication operator investment cases. To practically apply and to verify the methodologies and the tools, the project team has been calculating four example investment cases:

- UMTS
- Fixed – mobile convergence
- IP with and without ATM
- Advanced access networks.




In particular the project has carried out work on real options and game theory, reflecting in the analyses that telecom investments often are made under uncertainty and that the impact of the competitor's decisions influence the investment cases. The techno-economic tool TERA, developed in the European Union's ACTS project TERA (Techno-economic Results from ACTS), has been applied in the analysis. EURESCOM shareholders can use the results of the calculations to make better decisions should they have to invest in similar cases. They can also look at the lessons learned from the example investment cases and can, together with the recommended methodologies and tools, improve the calculation of their own investment cases.

The project has provided five documents so far of which the last one ('Application guidelines for using the investment analysis methodologies and models') summarises the results and tells the interested shareholders how they can apply the recommended methodologies and tools to their own investment cases.

The project results are partly available and will be completed during October 2000.

Please see

**http://www.eurescom.de/public/projects/p900-series/p901/p901.htm**

# Great market data from EURESCOM

Richard Ling
Telenor AS

The scene is a crowded market with lots of market players rushing back and forth to chase after the latest supply and demand of telecoms. Some market actors are rushing off towards offerings that are just closing and others are just arriving and trying to get their orientation. Many different languages are being spoken. In the corners and alcoves are different peddlers, consultants and data pushers each offering their wares.

As the scene opens a young, upwardly mobile actor is rushing after the latest offering from ADSLMDS. Rumour has it that this radio multiband reverse decoded pEmpeg IV technology will revolutionise the transmission of small interlaced data bursts. He is sure that this is the gold mine that will pave his way to easy street. As he rounds the corner he sees that the vendor making the offer has just left. Disappointedly, he turns and starts back. Just then a data pusher catches his attention.

*"Psst, hey buddy. . . Psst! hey yeah, you. Come here, do you wanna great datafix?"* asks the data pusher in a gruff voice.

*"What? Huh? Oh God don't bother me"* replies the young market player.

*"No really, this is good market data. It is fresh and deep. It comes from P903."*

*"What?"*

*"I said it's good data! We're gonna have great penetration statistics and the demographics are gonna be the best there are! We're gonna get it from a great sample of European households"* says the pusher.

*"Don't bother me. Can't you see that I just missed a great offering?"*

*"Yeah I see that"* says the pusher sarcastically. *"Disappointment is written all over your face. But tell me wiz kid, what were you going to do with that reverse decoded pEmpeg IV*

*technology? Huh? You were just interested in the bit rates. Am I right or what? You are just like all the rest of these cheeses here. Bit rates, bit rates bits rates and more bit rates. That's all you care about. Tell me this, Mister Bit Rate, what are you going to use all those bits for? Huh? Can you tell me that? People don't use bits, they use services.*

*"Yeah but this was a 4X improvement over the gEmpeg standard!"*

*"4x, 10x, 50x, 1000x I don't care!"* replied the pusher almost shouting. *"You are still not answering the question! What are you goin' to use all these bits for? I am telling you, you gotta give the people services, not bits and that's what I can help you with."*

*"How can you help me?"* asks the market player in disbelief.

*"Like I say, I got good data on what the people want and what they need."*

*"Yeah, sure you do"* says the market player. *"And I am Santa Claus."*

*"Look,"* says the data pusher "*I saw how disappointed you were when you missed that last offering and I said to myself 'Here is a guy that I can help out'. I got this great data from EURESCOM P903 that is both qualitative and quantitative. You're in EURESCOM aren't you? Like I say, we had 36 focus groups and will have thousands of interviews in a whole slew of countries. It covers the needs of European households and will give us a good idea as to what makes people subscribe to the Internet and also buy mobile telephones. It tells us about what they will be wanting in the future and here is the best thing of all, it is free."*

*"What?"*

*"Like I say, it is free, gratis, no cost to EURESCOM chumps like you. Do I have your attention now?"*

*"Sure, but I still don't know what good it is to me. How is it going to help me increase data transmission?"*

*"You are lookin' at it from the wrong end kid. Let me tell you a story. There was a telecom operator that wanted to roll out EMTg III technology. You know the technology that could give a single channel of 45m reverse complex bits. You know the stuff.*

*At any rate, they thought that they could just hook up a cable to people's TV and that they would start watching. You know what? The telecom didn't know that people already had an average of 2,6 TVs per household. This meant that the single channel EMTg III technology wouldn't work since it assumes that people have one TV per household. People were already ahead of the capacity for the technology. Now I am not sayin' the EMTg III is bad stuff, it is just that it was not in tune with what people already had, and what they expected.*

*Well, this telecomm used a pile of Euros to develop the technology and when the time came – for roll out, guess what? Nobody wanted the technology is what. These smart guys hadn't done their homework. They were so busy pushing bit rates that they forgot to check and see what was going on with the people. That is what is so great with the P903 data here. It gives you the chance to check out what is going on with the people. Not just in your home market but also in a lot of places across Europe. So listen to what I am sayin' now. Go ahead with your radio multiband reverse decoded pEmpeg IV or whatever it is. It is great to increase bit rates. But before you get all excited about 4X or 40X or whatever, check it out with the people, and find out where they are at. That way you avoid investing a pile of money in something that doesn't fly, if you know what I mean."*

*"O.K., but where can I get the data?"*

*"Like I say, it is right here. EURESCOM P903 will have it early next year. They are using the shareholders' money to collect the data and they gotta bunch of data jerks that are goin' through the material to get the low down bird's eye on this stuff. Let me tell you, these people are good. They know what data is and they know how to analyse it. This isn't your mushy consultant stuff, it is good data and solid results. And like I say, it is free for EURESCOM folks.*

*"Thanks, I'll check it out."*

*"Do that. You won't be disappointed. And er, in the mean time can I hit you up for a cigarette and some small change? You know how it is."*

## This little story ...

... shows that it is sometimes not obvious that as a EURESCOM shareholders company you can get a lot of valuable market data for very little money, because the whole EURESCOM community shares the cost.

The EURESCOM project team of P903 working on the study 'Cross cultural attitude to ICT in everyday life' is undertaking a big survey in several different European countries to collect important market data on the use and non-use of ICT. After a 'qualitative' phase which has just ended, the project is now entering a 'quantitative' phase where thousands of ICT users and non-users will be interviewed to find out why they use or do not use ICT. The survey also aims at finding out the variances in ICT usage of different user segments.

The quantitative results, which will be available in March 2001, will be compiled in a database to ease any data analysis which EURESCOM shareholders want to undertake.

Moreover, the project has set aside a significant amount of resources to do a lot of data analysis themselves. The results will be provided in a project report available to EURESCOM shareholders in April 2001.

# Paving the way to real broadband access

One of EURESCOM's all time most intense projects, called BOBAN 'Building and Operating Broadband Optical Networks' (P917), is about to finish. The project presented its results at a workshop in July (see the report in this issue). In the following we will highlight some key results of BOBAN that are immediately exploitable. This is not an exhaustive report of all results, but a selection indicating the variety of issues addressed and solved by BOBAN.

## BOBAN guidelines for ADSL rollout

Six ADSL field trials and four ADSL lab trials were conducted as part of the BOBAN project. The lab trials focused on performance, interoperability, and co-existence with other DSL technologies and plain old telephony service (POTS) interference in a controlled environment. The field trials were conducted to investigate real-world deployment issues such as installation in a typical home environment, effects of in-house wiring and POTS splitter options. Our key results provide guidelines for effective service roll out:

- It is much easier to utilise micro-filters instead of a central one to split off POTS.
- Universal serial bus (USB) modems are simplest to install.
- Inter-vendor interoperability is a reality.
- Downstream performance is worst affected by E1 PCM.
- Upstream performance is worst affected by HDSL.
- A Broadband Access Server is essential for multiple Service Provider support.

Using these guidelines EURESCOM shareholders can now roll out ADSL more quickly and to the greater satisfaction of their customers. By providing competitive fast access to the Information Highway they can preserve their leading role.
The forthcoming BOBAN project report 'Low cost DSL' will provide a detailed account of our results.

**Tommy O'Connor**
**Head of R+D Labs, *eircom* Ireland**

## European broadband street cabinet

The next logical step after ADSL will be the deployment of fibre to the cabinet (FTTCab) systems, which increases the number of potential customers and enables the provision of more sophisticated broadband services through the latest VDSL technologies. FTTCab systems are based on an optical transport system terminated at the ONU (Optical Network Unit) inside the street cabinet and a VDSL link as a final drop.
A key element to this strategy is the outdoor cabinet, which has to be designed for hosting active equipment in the outside plant. BOBAN specified, implemented and tested a BB-Cabinet (BroadBand Cabinet) suitable for the environmental conditions of the different European countries. Operation in particularly severe environmental conditions was also considered and provided.
To this task a special 'development team' was set up from the experts of the project and a selected vendor. The 'development team' has identified the common requirements for the BB-Cabinet, both from the technical and the operational point of view. Issues like the ONU dimensioning (size, number of BB-lines, power dissipation), powering options, environmental conditions and safety have been considered in detail, allowing the drawing up of a common BB-Cabinet technical specification. This common BB-Cabinet specification developed by BOBAN has been included in the Full Service Access Networks 'Common Technical Specification for DSL-based FTTx Systems'.
Next, a limited number of prototypes of the BB-Cabinet were realised and tested both in laboratory and in outdoor environments. One prototype of the BB-Cabinet has been installed at the CSELT premises (see picture) and integrated in the BOBAN service trial. Another three prototypes are installed and tested under real environment conditions at France Télécom R&D, Deutsche Telekom T-Nova and Telenor. An evaluation of the compatibility of the BB-Cabinet with different equipment and technologies will be carried out in the framework of the subsequent EURESCOM project FREEHANDS (P1015).
As a result EURESCOM shareholders can now start deploying FTTCab systems relying on the EURESCOM BB-Cabinet specified to their needs and fully tested. The cabinet is commercially available from one supplier with a short delivery time, but the specification is open to other suppliers. Adopting this solution telcos do not have to invest individually for the expensive development and testing of a new cabinet. Moreover, this standard solution will hopefully lead to mass production and consequently a reduction in the cost of the cabinet. More details will soon be provided in the BOBAN project report 'Broadband cabinet survey, specifications, demonstrations'.

**Paolo Solina, CSELT**

## An efficient alternative for powering of remote broadband equipment

Enrico Blondel
Swisscom Ltd

The downtime of networks and the consequent loss of revenue represent a key aspect of the quality of service for an operator. In order to maintain networks with minimal downtime due to power outages, companies need a cost effective and reliable powering of the outdoor plants.

Furthermore, the power requirement for the access network and customer equipment compared to the power needed in the central office increases in an unprecedented way. Ten years ago, more than 90% of the power consumption took place in the central office and only 10% in the access network and customer equipment. This situation is likely to be reversed in the near future. Reasons are the increased complexity of customer equipment, the distributed intelligence and power hungry broadband technology in the access network and at the customer premises.

The result of our work demonstrates the benefits of remote AC powering of the access network infrastructure (such as a street cabinet) in order to save maintenance costs, improve reliability and eliminate the battery at the remote location. It takes an integrated approach to the powering of the whole telecom access network and customer equipment.

To investigate the regulatory aspects, a study was conducted that gave an overview of existing restrictions. We found out that such a topology of remote powering is possible, with some minimal restrictions, in most of the European countries.

In addition, laboratory trials on simulated and real power cables were conducted with various topologies and power levels to investigate the practical feasibility of such a solution. The results of these laboratory trials contributed to the definition of guidelines for the engineering of the whole access network powering. The collected experiences and results, showing the benefits of remote AC powering for access network infrastructure are summarised in the

BOBAN project report 'Medium voltage AC access network and customer equipment powering'.

To quantify cost versus complexity benefits, we have considered two topologies at the same rated power: Firstly, the proposed remote medium voltage AC powering and secondly, the local powering solution. Expected cost benefits of the remote powering solution are related to less hardware – such as batteries and a power meter – to implement at the remote location and less complexity. Other major cost savings are achieved in maintenance and troubleshooting.

The project results indicate that remote AC powering is a technically feasible, cost effective and reliable solution. It should therefore be considered as a viable alternative to the existing solutions.

# Integration of IP over optical networks

With the help of the results of the EURESCOM project on 'Integration of IP over optical networks' (P918) EURESCOM shareholders can now improve the efficiency of IP transport in their backbone networks and successfully compete with the new operators adopting the latest technology in a greenfield situation.

There are as many as 15 proposals on the table promising the winning technology platform for the IP services. Many people believe that telecom operators should abandon the multi-layer stacks of traditional technologies and look for more innovative solutions such as using IP directly over WDM networks.

This is exactly what P918 investigated with the participation of 11 EURESCOM shareholders. It addressed the network architecture issue in conjunction with the management aspects. Available techniques and solutions for transporting IP-based traffic were reviewed. They all aim to reduce the level of redundant functionality and the protocol overhead, simplify the network management, and thereby transport IP as efficiently as possible over WDM-based optical networks. The proposed new IP network architectures were compared in detail from the aspects of performance, service, interoperability, functionality and management. In conclusion the 15 alternatives were narrowed down to 3.

A management concept was also created for optical transport networks (OTN) that supports the multi-client capability of the OTN – with special focus on the IP client – and allows management of optical network elements from different vendors.

WDM-based IP transport networks with simplified architectures and vendor & client independent management solutions are clearly a prerequisite for tomorrow's high capacity networks. P918 produced a uniquely comprehensive comparison of the proposed solutions.

The highly relevant results of the project are already in use at some of the participating shareholders and help to solve critical problems:

- One of the shareholders uses a simplified IP network architecture solution called Packet Over SDH (POS) in its WDM-based backbone, that was found very promising by P918. In this scenario the optical layer serves as an integration platform for different client signals (ATM, SDH, IP).
- Another shareholder uses IP over GigabitEthernet (GbE) in WDM-based metro networks including fibre to the building broadband Internet access with switched Ethernet. GbE was also among the most promising solutions P918 recommended.
- A third shareholder has used the results concerning the IP network architectures as a thorough background information for an intensive vendor co-operation.

The significance and the current relevance of the project results to network operators is also well reflected by the very high number of contributions which the project team produced for ITU-T.

More information is available on the EURESCOM Web site

**http://www.eurescom.de/public/projects/p900-series/p918/p918.htm**

**Hans-Martin Foisel**
**Project Leader of P918**

# Competitive Public Key Infrastructure solutions

Antti Siltanen
Finnet Group

One of the critical issues for the uptake of electronic and mobile commerce on a global scale is the provision of reliable interoperable international security systems. Our project P1001 (Public Key Infrastructure Implementation and Test Suites for Selected Applications and Services) will provide the necessary tools. The main purpose of the project is to establish competitive PKI solutions to support security services to be offered to customers or to be implemented between telecommunications network operators for inter-communication purposes.

## Applications and services

The increasing importance of encryption in the telecommunications infrastructure has lead the telecommunication network operators to promote the investigation of security services and the investigation of public key infrastructures (PKI) as a basis for specification of all security services.

A predecessor EURESCOM strategic study, on 'Impact of PKI on the European Telecommunication Business' (P944), already addressed the importance of PKI that needs to be integrated into different applications to govern the use of cryptography for integrity, authentication and confidentiality in Trusted Services.

There are certainly great expectations for digital certificates and PKI to provide the security infrastructure for e-business. There is a big list of services and applications that can benefit by utilising PKI, ranging from well understood services such as document exchange (secure e-mail, registered e-mail, secure workflow), secure networking and home banking, to less mature applications such as remote working, health care services, mobile commerce or ISP roaming services. Hence the introduction of PKI services is a key business opportunity for telecommunication network operators.

## Trusted Services

To provide a common PKI model as a basis for inter-telco security services and for global security services, a framework consisting of Trusted Services was already defined in project P944. From the current perspective the objectives related to the major functions of Trusted Services are to identify, define and verify operational, technical, regulatory and legal aspects in such detail that the results can be used to assess the effectiveness, economics and acceptability of Trusted Third Party Services (TTPs).

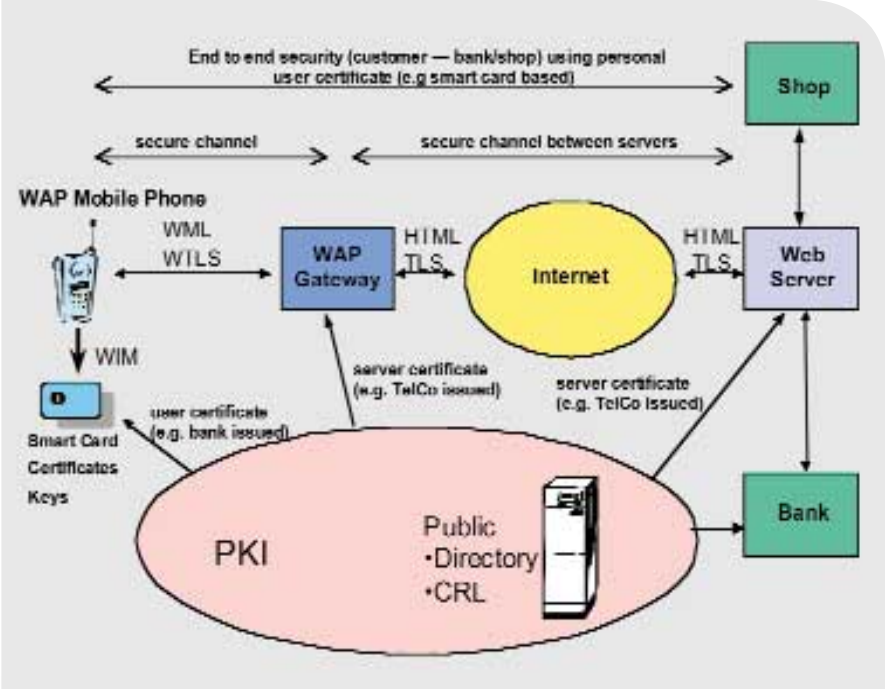
Like any regular company, telcos are involved in security related issues, e.g. how to protect their own information systems, how to communicate securely with different entities or how to offer secure services to their customers. In order to resolve these issues one of the major objectives of the project is to implement a European-wide PKI platform for reviewing and testing the interoperability of a number of selected services and applications.

PKI can protect the information assets of all players in the ICT landscape – the customer, the service provider and the network operator – in several essential ways:

- Authenticate identity.
- Verify integrity.
- Ensure privacy.
- Authorise access.
- Authorise transactions.
- Support for non-repudiation.

## PKI services and applications

Project P944 has identified a set of technologies and applications that benefit from the use of PKI. Following its conclusions a key objective in project P1001 is to perform functional testing with selected applications in a PKI environment. As part of a field trial the EURESCOM information and communication services used by the project are being modi-




PKI role in WAP services

fied to support PKI. This is achieved by using digitally signed documents and forms and if authentication is required, certificates stored on smart cards are used instead of username and password-based authentication. This allows the project participants to experience in practice the benefits that result from the use of PKI.
Interoperability issues remain an integral part of the testing phase throughout the project, e.g. bilateral testing of Europe-wide Certificate Authority (CA) platforms and management of Certificate Revocation Lists (CRLs) between telcos. Interoperability at the highest level of PKI, i.e. interoperability between telcos, can only be achieved by using uniform methods and technologies.

Testing is extended to include also the scenario of replacing ordinary billing routines in wireless environments with the use of certificates. This implies the use of so-called certified tickets.

## Wireless PKI

Undoubtedly, if PKI is to be the solution for future secure transactions it will not limit itself only to a single network environment. The encryption in wireless environments is rapidly advancing. The integration of the Internet and the mobile world needs technologies that can assure confidentiality and integrity across technological boundaries.
One work item in P1001 is to introduce PKI into the present GSM Phase2+ environment and to investigate the use of Trusted Third Party services (TTPs) in UMTS. The management of complex trust relationships involved in the provision of end-to-end security services for UMTS, implies solutions based on TTPs. In addition to GSM technologies, the use of PKI is tested in WAP application environments.

## Mobile IP security

Another work area in P1001 is mobile-IP security. The purpose is to identify the mobile-IP weaknesses that can be solved with asymmetric key infrastructure. In addition a reference architecture, defining the different actors and roles involved in mobile-IP networks with added security is being modelled. This architecture should serve as a recommendation for equipment vendors as well as PKI vendors for enabling security in mobile-IP.

# Security for m-commerce with WebSIM

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In issue 2/2000 mess@ge reported about the EURESCOM project P1005, titled 'Jini & Friends @ Work'. One of the first prototypes delivered is the so-called WebSIM, an implementation of a stripped-down Web server inside a GSM SIM, based on the SIM Application Toolkit platform (SIM AT). The WebSIM is now in a small field trial among P1005 partners in order to study and demonstrate possible applications of the WebSIM approach. In particular the domain of mobile commerce security and SIM-based authentication initiated from the Internet are considered.

This article describes some of the application scenarios investigated by the project and discusses how mobile operators could offer the WebSIM framework as a security service to other service providers on the Internet.
The main contribution of the WebSIM is to open up the SIM to the Internet, by providing an Internet-compliant interface to services of a SIM. We sketch a few applications for different application domains. Much more is possible. The most promising aspect is that the WebSIM provides a 'horizontal' technology upon which third parties can build applications. Rather than having to deal with a different interface to a SIM each time, Internet applications can access and activate SIM services in their own language, namely HTTP.

## Authentication as a service for Internet Service Providers

Businesses that offer their services over the Internet, such as on-line bookstores, shops, or banks need secure identification of their customers. Online orders are usually placed via Web forms or call centers. Authentication takes place in various forms, e.g. password-based authentication schemes.

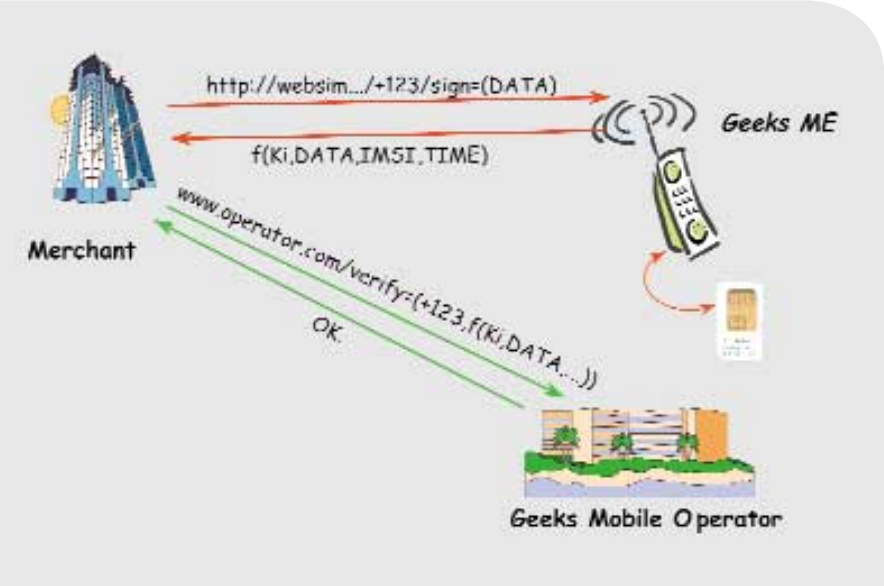
## Authentication as an operator's service

In contrast to this, the WebSIM can be used to authenticate subscribers using the secure GSM-internal cryptographic keys (like the key Ki, see diagram on the next page).

## WebSIM authentication

- Using HTTP, the ISP activates a server-side application on the WebSIM by way of the operator's proxy[1] and passes a random challenge.
- The WebSIM server-side application asks the subscriber using SIM AT to authorise the authentication, computes $f$(Ki, RAND) and passes the result back to the ISP as an HTTP response. This can easily be done by providing a CGI script in the WebSIM that uses SIM AT for interacting with the user.
- The ISP passes RAND and $f$ (Ki, RAND) to the operator, who can check if the result is correct, based on his knowledge of Ki. An appropriate billing scheme for this kind of verification needs to be investigated.

[1] The function of the proxy is to bridge the gap between the Internet and GSM.




**WebSIM authentication**

This is a classical challenge/response authentication which can also be used in many other application domains (home banking, access control, etc.), or can easily be adapted to provide a session key for other purposes. For security reasons, the scenario can also be based upon other cryptographic algorithms (like 3DES) and keys other than Ki, or with keys derived from Ki.

## Provision of one-time passwords

One-time passwords for login procedures can be easily implemented with the WebSIM:

- The user subscribes to a service on the Internet and provides his or her mobile phone number.
- The user compiles a shopping list in the Internet shop and places the order by submitting the shopping list.
- The Internet shop's Web server displays a one-time password to the customer. Simultaneously, the Web server issues a WebSIM request to the phone number asking for the one-time password on the mobile phone.
- The WebSIM prompts the user via an input dialog to provide the one-time password on the mobile phone. The user enters the one-time password, which is sent back to the Web server.
- The Web server checks whether the entered one-time password is correct and generates a response-page for the client acknowledging the order.

The advantage is that an authentication channel (GSM) is used to verify the identity of the customer. Another, reversed variant of this might be as follows:

- After submitting the shopping list, the Web server generates an input form where the user has to enter a one-time password; the server simultaneously sends the one-time password to the WebSIM.
- The user enters the one-time password, via a WebSIM input dialog on his or her mobile phone into the Web form. The Web server checks the one-time password and acknowledges the order.

## Using WebSIMs as I/O channels

Interesting applications are possible if the WebSIM implements CGI scripts that provide an interface to SIM AT. This allows for applications inside the SIM to interact with the user of the mobile phone. One can, for instance, imagine the following scenarios:

## Secure user interaction

A person holding a mobile phone with a WebSIM is standing in front of an ATM, and calls a telephone number displayed on the ATM. The ATM system knows the Web address of the WebSIM, since it can be derived from the CLIP (Calling Line Identity Presentation), and it can run several subsequent CGI scripts in the WebSIM to authenticate the transaction, choose the amount of cash to be dispensed, etc. Essentially the GSM phone has become the human interface to the ATM and one can imagine ATMs that do not have complex and expensive human interface hardware but have just a telephone number sign and a cash-dispensing slot. Similarly, one can implement online payments, access control, ticket vending, etc.

## Internet auction client

In contrast to WAP, which is currently a pull-based technology for Internet content, there are various applications urging for a more push-based style of communication. As an example, consider on-line Internet auctions in which a WAP user would participate by regularly checking for newly placed bids for an object of interest. This would not only be annoying for potential users but also slow and expensive.

Using the WebSIM one can implement a push-based client that behaves as follows:

- After registration for a certain item in an auction, a user delegates auction interaction to the WebSIM by providing the mobile phone number to the auction company.
- Each time a new highest bid is placed – other invocation schemes can be thought of – the auction sends a request to the WebSIM that informs the mobile user about the currently active highest bid and asks for entering a new, higher bid.
- The user can then decide to decline or to increase and enter the new bid which is then sent back to the auction house that places the bid.

This turns the WebSIM into a full-fledged, mobile, push-based communication module allowing for user interaction not supported by e.g. the Wireless Application Protocol.

## SIM-based Web browsing

A WAP-enabled mobile phone provides a client that can interpret WML, a simple variant of HTML. A similar Web browsing approach can be implemented using the WebSIM, by changing the server role of the SIM into a client role using a standard trick: we simply turn the WebSIM into a push-client that displays information and prompts the user for a response. Assume a server holds Web content as nested CGI scripts that run SIM AT proactive commands like *CHOOSE ITEM* in the WebSIM.

If the server actively sends ('pushes') this to the WebSIM, the Web server in the SIM acts like a client, displaying the content and querying the user for the next action. The initialisation of this process can itself be done by a SIM AT SETUP MENU command, possibly sent over another CGI interface in the WebSIM.

## Obtaining location information

Location-based services are a hot topic in today's mobile commerce scenarios. The general assumption is that for a significant amount of mobile services location can aid in better service provisioning. Some examples:

- *Mobile tourist guide*. Get information about the current location of a mobile user, its history, and other valuable information for tourists.
- *Near-by services*. Check out near-by restaurants, shops, restrooms, ATMs, public transport facilities, etc.
- *Where am I? I'm lost!* Check for maps showing the current location a user is at and other useful information for localisation.

To support this kind of services based on location information we have implemented a WebSIM script that uses the SIM AT command *PROVIDE LOCAL INFORMATION* to query the phone for its current location within an operator's network, e.g. mobile country code, network code, local area information, and cell ID. The mobile operator can translate this information into a more convenient format, such as longitude/latitude co-ordinates, or even into hyperlinks under which maps can be downloaded providing the location in different degrees of precision.

Our prototype is called the Mobile Homepage of a mobile user. This homepage can be accessed after successful Web-based authentication to restrict access to location information to an authorised group of people only. Furthermore this Mobile Homepage can show context-dependent information of a mobile user, e.g. whether he or she is currently in a meeting. This kind of information can be configured by a SIM AT application in the WebSIM. This allows authorised people to infer that "I'm currently in a meeting at EURESCOM and that I'm likely to be reachable in about two hours."

## Conclusion

Within project P1005 we have already demonstrated a number of useful and interesting solutions to problems in the field of mobile commerce. Furthermore, the potential of the WebSIM can also be shown in its provision of location information being a hot topic in the current mobile commerce discussions. Finally, we have shown the ability to implement push-based services such as the mobile auction client on top of the WebSIM. We hope that the WebSIM inspires others to come up with new interesting services for mobile users.

# Intelligent fraud detection could save a fortune

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**Broadcom Eireann Research Ltd**

**Stephen Lamb**
**British Telecom Plc**

## Introduction

"Major European telcos' share price falls as increasing fraud hits profits in new services" – nobody wants to see headlines like these in the news, but every day millions of euros in operator revenue are lost through fraudulent activity.

The EURESCOM project 'Application of Intelligent Techniques to Telecommunications Fraud Detection' (P1007) seeks to avoid headlines such as the above by developing prototypes that use intelligent computational techniques new to the communications fraud arena and by evaluating their effectiveness and usefulness to communications fraud units.

## What fraud?

In the context of this project fraud incorporates any activity that amounts to unwanted or unauthorised access to, and usage of services, properties or networks. This definition includes actions that are intended to cause financial loss to any party or loss of public image. A classic example of a modern day fraud is call-selling: In this case the fraudster establishes a bogus subscriber account and then abuses specific telephony features such as call-forwarding and three-way conferencing to set up multiple, simultaneous calls. These calls are then sold to waiting third parties at a low rate. Call-selling along with many other categories of fraud that exist today are likely also to occur in future networks and services (including those that are IP-based). A number of factors however increase the possibilities for new frauds. New services will be deployed in ever-shorter time scales often with short life spans. De-regulation enables new multi-party business models involving network operators, service providers, application providers and content providers. Accounting and billing systems are more complex and traversing many more system interfaces. To cope with these rapid changes fraud management and fraud detection need to become a more sophisticated and truly dynamic discipline.

The project is currently in the process of deciding which types of fraud it will primarily address, the current shortlist includes:

- Call-selling and the linking of various call-selling cells to obtain the wider picture.
- IP-based frauds.
- Roaming related fraud in mobile networks.
- Subscription fraud, particularly in terms of assessing the risk of fraud or deliberate bad debt.

The anonymous nature of mobility products is also being considered as one of the many facets of all the shortlisted problems.

## What are the potential savings?

Most telcos have gone to great lengths to improve their fraud fighting capabilities during recent years. Several independent sources however still think the loss to fraud amounts to between 3% and 6% of annual revenues. Some telcos, particularly new entrants, have not yet realised the full complexity and consequences of living with fraud. This may have negative implications not just for their overall business but also for the industry as a whole. Even in the UK, where the 200 plus network operators have access to bodies such as the Telecommunications Fraud Forum (TUFF) and co-operate to reduce fraud, the losses can be significant. According to figures issued by TUFF telephone fraud in 1999/2000 cost business £750 million in the UK alone [1]. The Federation of Communication Services (FCS) claim cellular fraud alone in the UK amounts to £100 million per annum [2], and that some new entrants to the telecommunications market face fraud losses of up to 20% of turnover. On a global scale fraud losses in the region of $30 billion have been estimated [3]. The FCS does however provide some good news stating that companies that have succeeded in addressing and managing fraud have reduced this burden to as little as 1 to 2 % [4].

In terms of the effect of fraud on public image it is even harder to estimate the costs. However, negative media headlines will have a serious knock-on effect in terms of sustaining and building a loyal customer base.

It is rarely disputed that telecommunications fraud is a significant problem that needs to be fought with conviction. The project participants are acutely aware that efficient and cost-effective fraud detection systems can lead to substantial savings and prove to be a sound investment.

## Detecting fraud

Call-based fraud indicators remains the most common means of fraud identification. These indicators may be combined in different ways with different weightings to optimise detection and minimise the number of false alarms.

Fraud Management Systems (FMS) are used to monitor subscriber usage and behaviour. Rules are used to detect irregular and suspicious activity indicative of fraud, typical rules concern:

- Number of calls.
- Accumulated minutes of calls.
- Long call durations.
- Parallel calls and geographic velocity (the feasibility of a subscriber or handset having travelled the distance between the originating locations of two calls given the difference between the call start times).
- Calls involving 'hot' locations, routes and numbers.

Having detected an alarm an FMS can automatically initiate response procedures defined in accordance with business operations and fraud policies. The value of follow-up action on alerts depends upon the likelihood that the alert is accurate, so appropriate user-defined parameters and configuration is critical.

It is increasingly obvious in a world where more operators are offering more complex services more quickly, that the traditional techniques for fraud detection will become less effective. Intelligent techniques offer the promise of being able to delve into the mass of seemingly innocent events, and extract those that in combination indicate network abuse.

The participants of P1007 have reviewed a number of commercially available FMS in order to establish salient features and key interfaces which must be accommodated.

## The application of intelligent techniques

Intelligent computing techniques are used to complement traditional rule and threshold-based systems, in particular to:

- Extend the functionality of existing fraud detection systems.
- Improve the recognition of fraud symptoms in FMSs.
- Assist in fraud diagnosis.
- Aid the analysis and classification of fraud cases.
- Incorporate learning mechanisms in FMSs.

Profiling, the most common mechanism, deals with a major weakness in rule-based systems, i.e. simple thresholds do not cater well for the wide variation of genuine usage between different customers. There are two main approaches to profiling:

1. The system generates profiles for each user and determines if they are similar to known fraud profiles.
2. The system looks for changes in the profile of each user over time that indicates the onset of fraud, e.g. a significant increase in usage.

Profilers commonly rely on 'neural-networks' which are commonly deployed in FMSs. There are, however, a variety of new intelligent techniques developed over recent years that may now be considered. Central to P1007 objective is the application of these new intelligent techniques to fraud detection and analysis. New techniques reviewed to-date by the project team include:

- Data-mining.
- Classification.
- Clustering.
- Feature selection.
- Measures of interestingness.
- Deviation detection.

These techniques tend to be very mathematical in nature and operate over specific data and parameters, which in turn determine the types of fraud to which they may be applied. Of particular interest to P1007 is data-mining, which can assist in both fraud detection and churn avoidance. Link analysis will find links in a data set that may not be obvious, such as two subscribers using the same credit card number, and alert the operator to the suspicious activity. It may also be possible that some data-mining techniques will be useful in identifying new types of fraud before significant loss in revenue arises.

## First results

The P1007 team (*eircom* plc, Koninklijke KPN N.V., Hellenic Telecommunications Organization S.A., Telia AB, Telefónica S.A., Portugal Telecom S.A. and British Telecommunications plc) are in the early stages of a two-year plan, but have recently published their first project results. This publication surveys the fraud problem and considers the state-of-the-art in fraud detection. The nature of the project, however, requires that the content of this publication be restricted to EURESCOM shareholders only. The project is now entering a prototype specification phase. One or more prototypes will be developed to evaluate the detection and analysis performance benefits, which can be attained from the application of the specific new intelligent techniques to selected fraud problems.

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# A shareholder's viewpoint

**Rossano Moretti**
**CSELT-Telecom Italia TLM**


## What is the value of EURESCOM results?

The issue of evaluating the return on investment is becoming more and more important for the telcos who have to cope with the speed of technological change and with the threats posed by competition. This should also apply to the research and development activities and consequently to the collaborative research done through EURESCOM. During the first half of this year this problem has been discussed in CSELT both with people from the R&D and with people from the operational departments. In most cases it was not feasible to evaluate the actual return on investment of EURESCOM projects but nevertheless an analysis was made both on the potential benefits and on the actual value of the more recent results. A few considerations emerging from the discussion and some relevant examples are reported in the following.

## Creation of common positions and contribution to standards

In many cases the Telcos need to discuss with each other and reach an agreement on common positions, procedures and models in order to fully exploit existing technologies; this is also true in those cases where there is strong competition among the telcos themselves. A significant example is represented by the EURESCOM project P906 'QUASIMODO' which addresses the issue of measuring, managing and charging the Quality of Service in IP networks: even if the QoS is used to differentiate the offer between the competitors they need to agree on a common set of parameters, methodology and functionalities. A common position of the EURESCOM shareholders will ease the future acceptance at the relevant standard bodies. The issue of the value in common contribution to standards, i.e. pre-standardisation activities, was one of the most debated during the discussion as nowadays it is becoming more and more difficult for the standardisation bodies to keep the pace of the fast technological change. Nevertheless, if we look at the deliverables recently produced by the EURESCOM projects we may find valuable results of this type not only directed towards 'traditional' bodies but also towards more recent and dynamic organisations. To mention just a couple of relevant cases we could refer to project P918 'IP Over Optical Networks' which has produced up to now 9 different contributions for ITU-T SG13 and to the project P914 'Internet Roaming' that had the aim to influence IETF with a new protocol for authentication, authorisation and accounting in a decentralised scenario.

## Interoperability of networks and services

The interoperability of networks and services at all levels is undoubtedly one of the major needs of the telcos and one of the areas in which they can get most benefits from collaborative research. Moreover the possibility to verify the specifications through large scale experiments involving different networks, systems and players adds value to the results. In the past EURESCOM projects have produced valuable contributions to the issue of interoperability especially at the network level (transmission networks and management networks), nowadays there is a shift of the focus towards the upper levels of the value chain i.e. at the level of the middleware and of the end user services and for new domains of application. One of the most recent and promising projects that can be referred to as an appropriate example is P1001 'Public Key Infrastructure (PKI) Implementation and Test Suites for Selected Application and Services'. The aim of this project is to enable the provisioning of secure services over the internet making use of the PKI mechanism. Among the various objectives of the project there is the setting up of a Europe wide test bed to verify on the field specifications and requirements for a certain number of selected applications.

## Sharing of risks, resources and competencies

The advantages deriving from putting together resources of different partners to work on a common goal, (i.e. reduction of research costs and investments, leveraging of productivity, complementarity of the competencies) usually overcame the overhead that is inplicit in such forms of co-operation. This is true for collaborative research in general but more specifically for EURESCOM where the infrastructure and the operational support provide for an easier agreement among the shareholders and a faster set up of new projects. In the project P909 'Enabling technologies for IN evolution and IN-Internet integration' that type of bene-

fit is particularly evident because each participant of the project implements different types of services (possibly on different platforms), and then the partial results are made available to all the others and experimented in an integrated scenario. It should also be noted that it is not always necessary to participate directly in a project to get the benefits; for example CSELT is not directly involved in the above mentioned project on Public Key Infrastructure due to lack of resources but nevertheless we are quite interested in its results.

This implies that in certain cases EURESCOM can also be considered as a tool for outsourcing activities to partners with available resources and competencies.

### But is everybody aware of these results ?

An interesting consideration that emerged from the discussion on the value of the EURESCOM results is that the awareness of people can vary considerably depending on the department they belong to (R&D or business units) and on the specific area of competence. While people from R&D are in general quite aware of the EURESCOM results, the awareness in the business units is high when the EURESCOM activities match some specific commissioned research but is lower in case of corporate research. This might be due in part to the different time horizon between research and business activities and in part to the way results are communicated and promoted. However, the major problem is the one that is affecting us all: information overload.

# EURESCOM workshop on broadband access networks in Turin

The Building and Operating Broadband Access Networks (BOBAN) workshop, one of the major EURESCOM events of this year, was held in Turin in July. The workshop at CSELT headquarters attracted 100 experts from the EURESCOM shareholder companies and the industry. This shows a high interest in the topics and the results of BOBAN, considering that July is part of the summer holiday period in many European countries.

### Access to the Net becomes vital

After Dr. Cesare Mosotto, director of CSELT, gave a welcome address to the participants, EURESCOM's director, Dr. Claudio Carrelli, opened the workshop. In his speech Dr. Carrelli pointed out that the relevance of access is highlighted by a widely accepted paradigm shift which is officially acknowledged by the UNO: The frontier of inequality will be no more between rich and poor, cities and rural areas, but between the 'haves' and the 'have-nots' concerning access to the Net. Taking this into consideration he finds it not surprising that there is an increasing competition over providing this access as well as gaining and keeping the customers. This, according to Dr. Carrelli, results in a situation where a number of competitive solutions co-exist, and will continue to do so in the foreseeable future. Dr. Carrelli knows: "The need for speed will command and we should adjust our thinking from the traditional linear scale to a logarithmic one."

Regarding how an operator can act under such circumstances Dr. Carrelli cited Charles Darwin: "It is not the strongest species that survive, nor the most intelligent, but the one most responsive to change".

Giovanni Destefanis, project leader of the EURESCOM BOBAN project gave an introduction to and background information on the BOBAN approach presenting the outline of the project. BOBAN studied a number of aspects of the broadband access networks and the results of the project were presented in 11 talks on the two days of the workshop.

The primary focus of the BOBAN project was on fixed broadband access solutions, based on the FSAN concept. FTTExch, FTTCab, FTTC/FTTB and FTTO/FTTH architectures were all considered, studied and experimented with.

### Powerline no alternative to broadband access

BOBAN showed on the basis of technical and economic evaluation that power line technology is not a real alternative to broadband access. There are major technical problems, such as high radiated emission causing interference and a weak business case, meaning that powerline can achieve profitability at relatively high penetration rates, only.

### EURESCOM trials show: ADSL is stable and cheap to deploy

BOBAN ran 4 laboratory and 6 field trials at the sites of 8 partners, and confirmed that the ADSL technology is proven and stable. Furthermore, self-installation using micro filters was successful in 90 % of the cases. In the other 10 % of the cases hardwired phones or unfriendly CPE, such as alarm systems, necessitate the use of a central splitter. Another potentially limiting factor is interference with other transmission technologies used in the copper access.

All targeted services – fast Internet, tele-working and video streaming – were successfully delivered to the customers. Finally, and most importantly, ADSL proved to be cheap to deploy.

The broadband street cabinet – one of the main achievements of BOBAN – was presented and also demonstrated. An alternative solution for

the remote powering of the broadband equipment that was developed and tested in BOBAN was also presented and demonstrated.

## Access network monitoring for improved QoS

BOBAN has also studied a critical issue from the point of operation – access network monitoring. State-of-the-art and guidelines for access network monitoring were presented. It was shown that proactive identification of future faults enables cost reduction through effective work scheduling, and leads to revenue recovery from minimised service disruption and avoiding contractual QoS penalties. The cost analysis shows, however, that monitoring may not necessarily be financially beneficial in all cases. At the same time an operator may still be compelled to monitoring in a loop unbundling scenario.

The specification of a universal access network planning tool, developed by BOBAN, was also presented. The next step will be the realisation of such a tool in co-operation with a software vendor.

## Future outlook: WDM in the access

As an outlook to the near and more distant future the use of the WDM technology in the access was discussed in detail. Three different aspects were presented: the evolution of PONs to WDM PONs, the use of WDM to serve large business customers, and the convergence of access and core networks, both adopting WDM transmission technology.

Additionally, the results of the Heterogeneous In-house Networking Environment project have also been presented and demonstrated. The main conclusions of HINE highlight the importance of 'always-on' and IP as a unifying platform.

There were also a number of presentations from the industry. A presentation from DSL Forum underlined the importance and role of loop qualification and testing in ADSL roll out and service provisioning. Regarding access network monitoring there was an interesting panel discussion including the experts of four leading vendors in this field.

Furthermore an interesting and so far unique approach in Europe was presented. The Swedish government financially supports the development of the necessary infrastructure providing access for everyone.

There were also contributions from operators reporting on their experience. A presentation from US West (now Qwest) provided insight into the large-scale VDSL roll out in Arizona/US. SMALL, an integrated activation system used at Telecom Italia for service provisioning was also presented.

The presentations were complemented by a visit to three laboratories of CSELT, where both the results of BOBAN and HINE were demonstrated.

The workshop was accompanied by seven exhibitions and live demonstrations by leading vendors.

The feedback from the audience was very positive. Not only the contents was appreciated, but also the excellent organisation and logistics, provided by CSELT.

**Adam Kapovits, EURESCOM**

**Mayor Beate Weber and Dr. Carrelli at the IEEE Conference**

# IEEE Conference in Heidelberg

The IEEE Conference on High Performance Switching and Routing (HPSR) was held at the Crowne Plaza Hotel in Heidelberg on 26 – 29 June. Over 150 scientists from five continents and 25 countries participated this year, as two previously separate, but thematically related conferences were organised jointly under the new name 'High Performance Switching and Routing Conference'. This event was the 6th 'IEEE ATM Workshop' and the first to be held in Germany. Next year both conferences will be separated again into the IEEE HPSR 2001 in Dallas and the ICATM 2001 in Seoul, South Korea. Dr. Heinrich Stüttgen, manager of NEC's Computer and Communications Research Laboratory in Heidelberg, organised the conference. Together with the German Electrical Engineering Society (VDE) and EURESCOM, the NEC-team put together an exciting conference programme. Six tutorials and 65 scientific talks offered plenty of stimulation for discussion of the latest trends in the area of Internet technology.

In her opening address, Heidelberg's mayor, Beate Weber, outlined how information and communication technologies represent a fast growing part of Heidelberg's economic infrastructure. With strong support from the city administration, the burgeoning IT segment has grown to become the number two industry in Heidelberg, second only to Heidelberg's traditionally strong biotechnology sector.

Dr. Claudio Carrelli, director of EURESCOM, gave the opening speech. His message to the attendees was that almost everything is possible in the Internet economy, but in the end, only those technologies that satisfy a clear market requirement will survive. Dr. Carrelli added that there are no universally valid doctrines and that only courage in striving for permanent innovation and solid knowledge of real market demands can lead Internet companies to success. His appeal to the conference participants: "Don't fight the changes – cause the changes!"

The conference programme clearly indicated a shift from cell (ATM) to packet (IP) switching technologies. Among the tutorials on the first day the 'MPLS tutorial' attracted the biggest crowd. There was also strong interest in the tutorials on 'High Performance Routing and Active Networks' as well as 'Multiservice Optical Networks – IP over WDM'. The latest devel-

opments in optical backbone and access networks were the focus of the keynote presented by Professor Piet Demeester from the University in Gent, Belgium. The keynote outlined how, in the next years, further development of the MPLS (Multiprotocol Label Switching) protocol will drive the technology towards MPLS, an efficient switching technology for the transport of IP-packets over WDM (wavelength multiplexing) networks.

The selection of the 60 best papers from the originally submitted 200 yielded a high quality conference programme. Besides 'IP over WDM', the focus was also on new protocols for wireless and cable access networks, scheduling methods for the next generation of 'Terabit-Router', provisioning of quality of service for audio and video traffic within packet networks, as well as new approaches for a better separation of the switching hardware from the respective control and management software.

**Heinz Brüggemann, EURESCOM**

# Yugoslav telecommunications market – vision and potential

The Federal Republic of Yugoslavia is composed of two constituent parts (republics) – Serbia and Montenegro. It has about 10,4 million inhabitants with a surface area of 102,000 square kilometres.

Reforms in Yugoslav telecommunications started in 1990. The separation of postal services and telecommunications, as the first step in the process of structural reforms, took place in Serbia in June 1997 and in Montenegro in January 1999. As a result, two telecom companies were created from earlier public enterprises – Telecom Serbia and Telecom Montenegro.

**A profile of Telecom Serbia**

**Telecom Serbia Profile (31.12.99)**

| | | | |
|---|---|---|---|
| **Ownership:** | Government of Serbia . . . . | 51 % | |
| | Telecom Italia . . . . . | 29 % | |
| | OTE, Greece . . . . . | 20 % | |
| **Operate:** | | | |
| Telecom networks: | | | |
| – MTL | | 2,2 | Million |
| – Teledensity | | 24,3 | % |
| – Digitalisation | | 47,18 | % |
| – Data X.25 | | 700 | Subscribers |
| – ISDN – BRA | | 6,832 | Subscribers |
| – ISDN – PRA | | 265 | Subscribers |
| Mobile Networks: | | | |
| – Mobile | | 100.000 | Subscribers |
| – Paging | | 25.000 | Subscribers |
| – Roaming | | 10 | Operators |

**A profile of Telecom Montenegro**

**Telecom Montenegro (31.12.99)**

| | | | |
|---|---|---|---|
| **Ownership:** | Government of Montenegro | 89 % | |
| | PTT employees . . . . . | 11 % | |
| **Operate:** | | | |
| Telecom networks: | | | |
| – MTL | | 240.000 | thousend |
| – Teledensity | | 37 | % |
| – Digitalisation | | 60 | % |
| – Data X.25 | | 170 | Subscribers |
| – ISDN – BRA | | 500 | Subscribers |
| – ISDN – PRA | | 35 | Subscribers |
| Mobile Networks: | | | |
| – Licence not still in operation | | | |

## Infrastructure and basic services operators

The Republic governments have licensed two incumbent telecom operators – Telecom Serbia and Telecom Montenegro – to operate all networks and offer all services in the telecom markets within the republic borders.

## Telephone network and switching systems

The public telecommunications network includes telephone networks, a telex network, packet-switched data networks (YUPAC) and mobile networks. The organisation of the Yugoslav telephone network follows the five-level hierarchy principle of switching centres.

## Transmission systems

The transmission network in the local exchange area is mostly based on symmetrical and coaxial cable systems. Microwave links, and optical cable systems are mainly used in the backbone network. 120.000 circuits are operational at the national level and 10.500 circuits on international routes. About 3000 km of optical cable were laid in the backbone national and international network for digital transmission systems, offering a capacity of up to 2.5 Gbit/s.

In addition to terrestrial links, there were three satellite earth stations used for international and intercontinental traffic until damaged and put out of operation as a result of NATO air strikes in April 1999.

## Mobile operators

MOBTEL and Telecom Serbia operate GSM networks in Serbia.

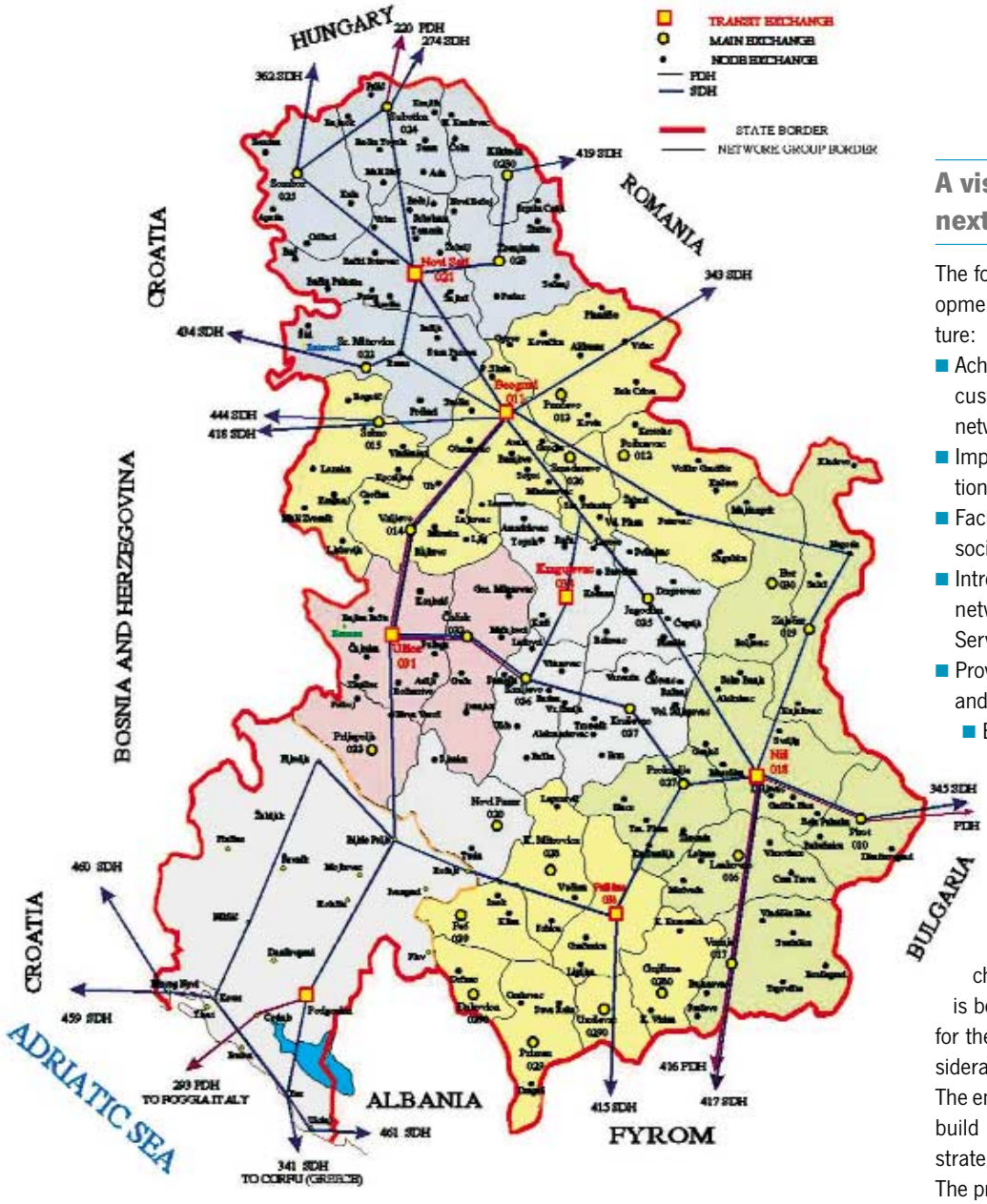
The MOBTEL GSM network covers more than 60% of the Serbian territory and reaches 80 % of its population. Nation-wide coverage is due to be achieved by the end of 1999. The number of the GSM customers increased by 150% during 1998, and a further strong increase up to 1,400,000 subscribers in 2002 is predicted.

Telecom Serbia started GSM operation in urban territories, including all bigger cities. Coverage is now provided to about 15% of the territory and 30% of the population. Nation-wide coverage is anticipated at the end of 2001. Telecom Serbia offers both prepaid and post-paid services.

ProMonte and Telecom Montenegro operate GSM networks in Montenegro. The ProMonte GSM network reaches 80% of the country's population and will be expanded to reach 93% by the year 2000. Public paging systems are in operation in both Serbia and Montenegro.

## The Internet

At the beginning of 1999, there were more than 30 Internet providers in Yugoslavia, at about 60 locations, of which one quarter were in Belgrade. According to provider records, there were more than 70,000 Internet accounts registered in Serbia. The biggest provider in Serbia is EUnet. Access is provided on the basis of




## A vision for the next millenium

The following objectives guide the future development of the telecommunications infrastucture:

- Achieve a flat structure with three segments: customer premises network(CPN), access network (AN) and core network (CN).
- Implement broadband services and applications.
- Facilitate the interpretation of the information society.
- Introduce principles of telecommunications network management for better Quality of Service (QoS).
- Provide an infrastructure for other operators and service providers.
- Ensure universal service obligations.
- Be compatible with the European infrastructure.

The future transport network will be based on synchronous digital hierarchy (SDH) technology, replacing current pleciochronous digital hierarchy (PDH) solutions. The first asynchronous transfer mode (ATM) network trial is being installed in Serbia and further plans for the implementation of ATM are under considerations.

The emerging services and the determination to build up an information society have put the strategy for local loop development in focus. The present situation of low teledensity and old copper infrastructure make the decisions on access network scenarios urgent.

The more people have access to the information and communications infrastructure, the richer the society.

The first step is enhancement of the existing infrastructure with digital subscriber loop (xDSL) technologies and wireless local loop (WLL). Among the considered scenarios are fibre in the loop (FITL) and radio in the loop (RITL).

**Natasa Gospic, Milan Jankovic and Borislav Odadzic,**
**Community of Yugoslav PTT**

switched circuits, with V.34 (33.6 Kbit/s) and V.90 (56kbit/s). The Public PTT Enterprise Serbia launched WAN based on TCP/IP called POSTNET. It is the Intranet for PTT Enterprise Serbia and the Internet for external subscribers.

## Pricing policy

The tariff system for the public switched telephone network (PSTN) related to zone distances is applied in Yugoslav telecommunications. Due to the difficult economic situation in the country and social policy, prices for local calls are kept very low, but prices for trunk and especially international calls are very high and there is no policy to adopt the current trends of 'death of distances'. As a result of such pricing policy, income from international traffic is used to cover low charges for local traffic. There is significant imbalance between incoming and outgoing international traffic in favour of incoming traffic.

## Telecom R&D organisations

The Federal Republic of Yugoslavia recognises science and technology as a key factor for the recovery of economy, increased productivity and long-term social development. Roughly one per cent of the gross domestic product (GDP) is spent for science. The development and technology transfer of information technologies (IT) are given top priority in an overall economic development. Several research organisations are dealing with telecommunications R&D: the faculties of electrical engineering in Belgrade, Novi Sad, Nis and Podgorica and the research institutes Mihajlo Pupin, IRITEL and IMTEL, all in Belgrade.

# Preparations for the Work Programme 2001

... are running very well. By the deadline of 18 August 2000 the EPS received 115 (last year: 123) preliminary titles and short abstracts for potential project proposals for the Work Programme 2001. The distribution of the submitted preliminary titles amongst shareholders is given in the table. Sixteen (16) shareholders and the EPS submitted these preliminary titles. The distribution amongst programme areas is given in the chart.

The paramount objective of the EPS for the period until 8 September 2000 (deadline for submission of PPDs) is to get 40 – 50 high quality PPDs on innovative and current topics out of these preliminary titles. From past experience these will be reduced down to around 30 retainments which should be a good basis for selecting 20 – 25 new projects for 2001 in the technical assessment step.

New for the Work Programme 2001 is that the Board has made recommendations on the relative size of the programme areas and on the project types and risks. The aim is to have around 25 % of the projects on issues that would have a significant effect on Shareholders' businesses in more than 4 years from their start. Two or three of the projects should be classified as high risk or highly speculative. A preliminary title does not necessarily mean that a project proposal will be completed and submitted, but we feel confident that this year we will also receive a high number of very interesting and challenging proposals. To keep abreast with the progress of the Work Programme preparations, please visit our Web page for further information.

**http://www.eurescom.de/secure/workprogrammes/PreliminaryTitles.asp**

Here we would like to extend our appreciation to those experts who, in this first step, contributed to the process.

## A first assessment of the submitted preliminary titles

A first read of the submitted preliminary titles shows that the current 'burning issues' of the shareholders are reflected in the ideas now being discussed. Not surprisingly in the *'Applications and services area'* the majority of submissions are addressing new 3G services with e-/m- commerce as the common application. Also large-scale experiments are addressed. Furthermore, the structuring of business level agreements and service level agreements and their mapping to suitable network performance parameters are raised. The measurement of network performance in a multi-provider environment is still a concern to telcos.

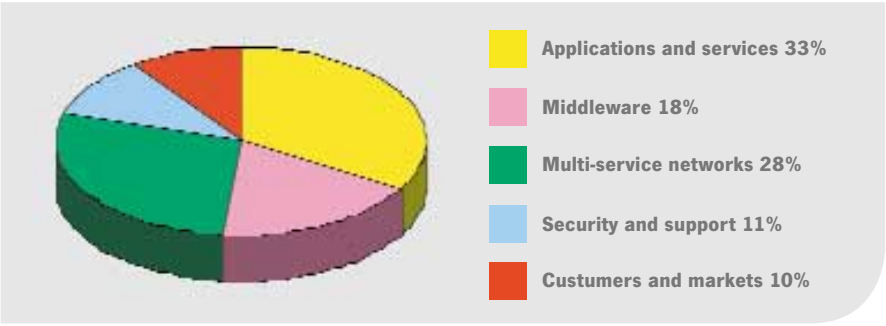
In the *'Middleware area'* the introduction of open source software and platforms is seen as a means to improve competitiveness in a rapidly changing and evolving communications market. The topics proposed are building on research/investments done in areas like object orientation, distributed services architectures and distributed computing (CORBA). A Strategic Study P1044-GI to be launched early September will help scope this area.

UMTS is also addressed from a Middleware perspective: The configuration and management of UMTS networks using new products based on open architectures (CORBA) and Internet appliances will be explored. Likewise the investigation of mobile agents as a technology for providing transparent network management and support for m-commerce.

Also the *'Multi-service networks area'* is characterised by the increasing interest for mobility. The implementation of IP techniques in wireless networks will lead to new requirements for protocols to support IP based mobility both for macro and micro mobility. Whereas current research activities are concentrating on macro mobility, i.e. hand-over mechanisms for roaming between different ISPs, time has come to focus on the complex and challenging issues of micro mobility of IP services in case of intra-domain fast hand-over between radio cells or different types of access networks.

There is a need to understand the relative positioning of various mobility methods/protocols (e.g. GSM, UMTS, 4G, etc.) and to identify the potential for evolving all of these towards a single unified solution. Ultimately, one key aim would be to identify the key requirements and propose solutions for very large, very complex, next generation distributed network control systems that will almost certainly be needed to be able to provide users with a 'plug-and-play' network interface.

Considering that both UMTS and wearable computers are powerful emerging key technologies for the business market and that wearable computers will enable a nomadic style of working, a prototype environment integrating UMTS and wearables are under discussion. Such a prototype could serve the identification of the right functionality and development of user scenarios thus scoping this extensive area.




**Preliminary titles and short abstracts – distribution among programme areas**

In many cases operators providing mobile multimedia 3G services will need to work co-operatively together to provide end-to end services.

In the *'Security and support area'* a proposal is addressing options for fully co-operative mobile multimedia 3G OSS across co-operating operators (including temporary transfer of data and processing responsibility) and the question of how to run inter-working experience between partners involved in assessing the costs and benefits of the different approaches devised.

Customers want and expect to do e-/m-commerce on virtually every communication device. Titles in the *'Customers and markets area'* indicate that European-wide solutions are inadequately analysed and propose to outline European-wide scenarios for m-commerce and pre-business models for new services. An important issue is to identify the threats and obstacles for m-commerce and to suggest solutions.

**Harald Johansen, Karin Becker**
**EURESCOM**

# A new face for EURESCOM's Web site

If you are a regular user of the EURESCOM Web services you have realised that since the beginning of July EURESCOM has a completely re-designed new Web site.

## Better navigation

The new Web site has a simplified navigation which allows you to access underlying Web pages faster and with fewer clicks. The drop-down menus from the main menu bar show all underlying menus and allow you to identify the proper link without opening additional pages. The site map shows all underlying menus at a time and also makes it possible for you to access the pages directly.

## Better match of the public and secure parts

The major problem with the old Web site was the strict split between two completely independent areas: the secure part and the public part. This split required a duplication of content which, to a large extent, was virtually the same in both parts. Inconsistency problems between both content types were a logical consequence and complicated the maintenance of the Web site considerably.
Secure information can only be accessed by entering a password which is required only the first time you access secured information in a session. Secured information can be recognised by a padlock either in the drop-down main menu or with the links, e.g. in project or deliverable pages.

## Java applets

The navigation of project and deliverable pages requires your browser to run Java applets. If this is not allowed by company policy you have to use the project/ deliverable tables as a navigation tool. For more technical details on possible problems or questions we suggest to consult our FAQ page from the support menu.

## Feedback

The EURESCOM Web team is always happy to receive comments and suggestions to improve the new Web site.

**webmaster@eurescom.de**

**Your EURESCOM Web team**

# Staff News

## Ilda Paixão

Ilda Paixão, executive assistant deliverables and seminars, returned to her parent company Portugal Telecom S.A. after working for EURESCOM for eight years.
She was responsible for all of the procedures necessary to control, edit and distribute the deliverables issued by the projects. Ilda was especially talented in juggling with various applications programmes and she was always ready to help colleagues with any problem that turned up. Numerous participants of EURESCOM seminars and workshops will also remember Ilda making sure that everything went off smoothly. She also checked if all of the presentations followed EURESCOM quality guidelines. Ilda received a hearty farewell by her colleagues on 27 July. Manuela Baker-Kriebel will take over the responsibilities concerning the deliverables, while Ellen Tallås will take over organising workshops and seminars.

**Ilda Paixão (on the left) at her farewell**

## Milon Gupta

In the course of restructuring EURESCOM's Marketing Milon Gupta joined as a public relations officer in July. The 35-year-old German is responsible for media relations, corporate design, on- and offline publications, events and other activities that increase the awareness for EURESCOM's work.
Milon Gupta has an eight-year record of professional experience in public relations. After studying history, political science and communications in Bochum, he worked as a freelance PR consultant for various clients, like the interior ministry of North Rhine-Westphalia, for two years.
In 1995 he became PR officer of a district administration in Mecklenburg-Vorpommern (former GDR), where he built up the district's corporate design and established media contacts across the border to Poland. Looking for a new challenge he changed to an international engineering company in Cologne. He designed and implemented integrated communications strategies to increase the company's corporate reputation in the building sector.
The Wuppertal-born single spends most of his spare time with chess, Tai Chi and reading non-fiction.

## Manuela Baker-Kriebel

Manuela Baker-Kriebel, a German-American born in Munich, is the new publications secretary at EURESCOM since June.
After studying English and German literature and language and political science at Mannheim University, Manuela worked as an English language and literature teacher and translator for fourteen years. At the age of forty she decided to pursue a completely new career in the field of public relations.
Her qualifications as a multimedia-marketing and -training consultant made a whole world of exciting job opportunities possible. She welcomes the challenges her job at EURESCOM offers and already feels completely at home as a team member.
Manuela is now responsible for handling the project reports, checking the English language quality of all EURESCOM publications and supporting the publishing and PR activities initiated by Milon Gupta. Last not least, she is also a member of the mess@ge editorial board.
In her free time she likes to take long walks along the Neckar river with her husband, besides reading novels and taking part in discussions at the German-American Institute in Heidelberg.

# UMTS

May I guess that the main things you have heard about UMTS are: '3G Mobile Network', '2 Mbit/s high speed access', 'multimedia-services everywhere', or 'license fees in the range of billions'? This article is a brief overview of what UMTS is and how we could benefit from it, but it also mentions some open issues and question marks.

## UMTS for global mobility

Universal Mobile Telecommunications System (UMTS) is the European version of the ITU's International Mobile Telecommunications 2000 (IMT 2000) global family of 'third-generation' (3G) mobile communications systems. ITU's IMT2000 can be regarded as an 'umbrella' for all regional versions of 3G systems. It ensures that all 3G systems, although having migrated from their incompatible 2G predecessors respectively, will allow roaming of mobile users world-wide. Coverage will be realised by terrestrial and to a minor extent also by satellite systems. 3G systems will be the successor of our 2G (e.g. GSM) and the analogue systems of the first generation of mobile systems.

## UMTS in the future mobile mass market

UMTS will play a key role in creating the future mass market in mobile communication. It will be capable of serving the increasing number of users in the fast growing mobile mass market. The world market for mobile services today is about 500 million users and is forecasted to rise to 940 million by 2005 and 2 billion users by 2010 world-wide.

## New services provided to UMTS users

UMTS users will be able to use their mobile phone world-wide. A fundamental difference between GSM and UMTS is the support of high bitrate bearer services in UMTS. The bit rate provided will be at least 144 kb/s in vehicular, 384 kb/s in outdoor/indoor and 2 Mb/s in indoor and picocell environments. This will enable a whole set of new services. Mobile-commerce (m-commerce) and mobile multimedia – even video transmission – will become feasible. Access to the Internet will be possible at a higher speed than today. Charging may be based on volume of transmitted data, and not only on time.

## New terminals

New services will require the development of new terminals. The possibility to transmit graphics or video will go along with larger and improved displays, and a small camera is likely to be integrated in the terminals. Other features could be imagined but this will depend on progress in related technologies – and on the demands of the mass-market customer.

## The technology behind

The origin of UMTS dates back to 1992 when the radio spectrum for 3G systems (1885-2025 MHz and 2110-2200 MHz) was defined. The force behind the definition of a 3G standard was the 3rd Generation Partnership Project (3GPP). 3GPP is a global standardisation initiative which brings together the world's

major standardisation bodies and industry groupings to co-operate in the production of a global standard for 3G mobile systems. The first set of UMTS specifications was approved in December 1999 as 'Release 99'. This is the basis for the first UMTS deployments.

The most significant feature of 'Release 99' is the Universal Terrestrial Radio Access (UTRA) for the Radio Access Network in UMTS. The basic access scheme for UMTS is Code Division Multiple Access (CDMA). In CDMA each user is assigned a unique code (stored on the USIM – the UMTS SIM card). This code is used to code the information before its transmission. By this coding the bandwidth of the data is increased. UMTS applies wideband CDMA (W-CDMA) in paired bands (2 x 5 MHz) for symmetrical services, and time-division CDMA (TD-CDMA) in unpaired bands (1 x 5 MHz) for asymmetrical services, e.g. WWW.

## Deploying UMTS

UMTS operators need to have a licence for the frequencies of the radio access network. Radio frequencies are a limited resource, and not all potential UMTS operators have been provided with a licence. Auctions have been held in many countries and huge amounts have been paid for licences (e.g. 8.4 billion Euro for one licence in Germany). The assumption is that companies that have paid high amounts for their licences will also have a high incentive for a fast roll out of UMTS networks and services. In many countries the licence comes with an obligation to cover about 25 % of the population by 2005 and 50 % by 2010. In practice, however, roll out might be much faster.

3G mobile networks will first be deployed in Japan, planned for the second quarter of 2001. In Europe operation of UMTS networks is planned to start in 2002. UMTS and GSM will operate in parallel for some time, possibly throughout the next decade. Dual mode terminals can be expected to be available to allow the use of both systems.

## Market perspectives

There are also critical voices. In spite of the technical progress of UMTS a clear business case has yet to be presented. The technology itself can not guarantee success. It is the services that have to be built on top of it. And it is the customers that use and pay for it. The provision of the right services is the key: useful, simple to use (which also applies to the terminals) and providing good value for money are only some features that a service should have.

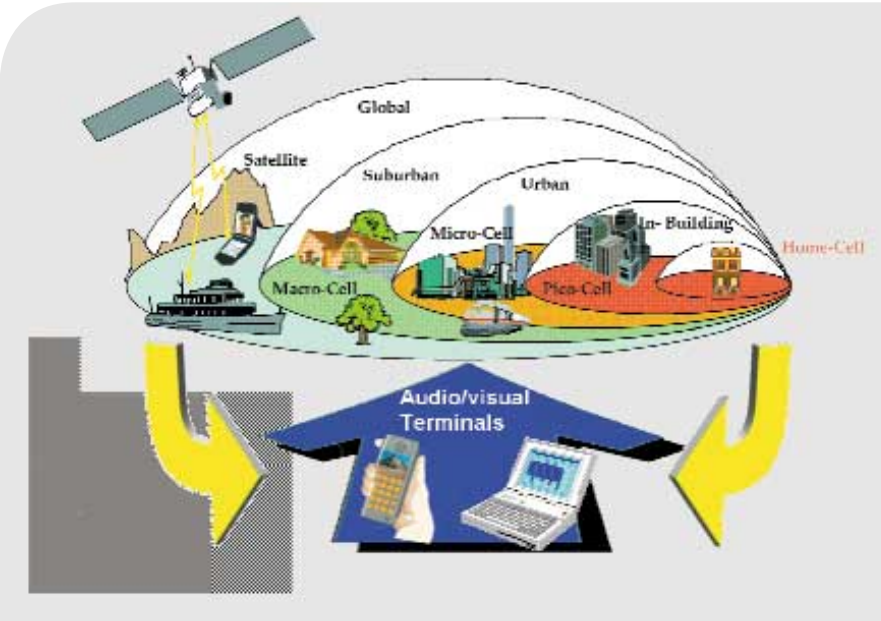
The 'high' transmission rate (2 Mbit/s) in UMTS is also more of a buzzword than a reality. 2 Mbit/s are only available in buildings and so called 'hot spots'. Most users have to make do with 384 kbit/s and users in vehicular environment will only get 144 kbit/s.

This should be compared with the about 100 kbit/s that is possible in GPRS (General Packet Radio Service), which is currently being deployed or already available in some GSM networks at the cost of a network software update. Another technology, EDGE (Enhanced Data for GSM Evolution), also based on GSM, is capable of providing up to 384 kbit/s – exactly what UMTS will offer to most of its customers. Both GPRS and EDGE already allow – like UMTS-volume based charging for data services. And in Japan, NTT DoCoMo created a success story with their i-MODE service, which relies on 9,6 kbit/s only. So, what is it then that makes UMTS so unique?

The most important feature could be the capability of UMTS to serve a mass market. Those who did not get a UMTS licence at the moment might be excluded from the mobile business in mid-term. The high data rates enables the provision of (nearly) all kind of services, even competing with the fixed network. And the advantage of a worldwide standard should not be underestimated.

UMTS is an ideal medium for value added services, for content providers, for marketing and m-commerce, only to name a few. Intelligent use of these potentials will, despite the high investment costs, yield profits in a few years.

**Uwe Herzog, EURESCOM**



# An ACRONYM is an ACRONYM

Acronyms – what would researchers be without them? Just the thought of a life without acronyms could cause even the brightest researcher to become depressed. What a nightmare, writing and saying Asymmetrical Digital Subscriber Line instead of ADSL, or, even worse, European Institute for Research and Strategic Studies in Telecommunications instead of EURESCOM. A life without acronyms would not only be detrimental in terms of mental health, but also in respect to the financial status of an organisation. Think of all the time wasted for explicitly saying and writing what can be done with a short combination of letters. A simple calculation may illustrate the sums at stake: Every researcher at EURESCOM uses 1 acronym every 3 minutes on average, saving 10 seconds each time. Based on an 8-hour working day this amounts to a time saving of 1,600 seconds or 27 minutes.

Despite the fact that most of us constantly use acronyms, we do not think about them much. What is an acronym? Basically, there are two answers. First, an acronym is a pronounceable word formed from each of the first letters of a descriptive phrase. An acronym is actually a type of abbreviation. Second, an acronym is an ACRONYM. What it stands for depends on your choice. There are at least 21 meanings, for example 'Advanced Cryptology Rendering Obviously Non-Sensical Yet Meaningful Stuff' or 'Alphabetically Coded Reminder of Names You Misremember'.

This brings us to the first of acronyms' two major drawbacks, and this is ambiguity. Quiz question: What is the meaning of ISDN? If you think, the answer is easy, you are wrong. The answer depends on your profession. To chemists it means 'sosorbitdinitrate', political scientists think more of the 'Institute for the Study of Developing Nations' and telecommunications people are sure it means 'Integrated Services Digital Network'. Surprising? That is nothing compared with the number of different meanings for the common acronym GSM. There are at least 24 of them, ranging from 'General Support Maintenance' to 'Ground Safety Manager', and, of course, 'Global System for Mobile Communication'.
Even the relatively new acronym UMTS has a double meaning: not only the well-known 'Universal Mobile Telecommunications System', but also 'Universal Military Training & Service'.

The second major problem is that not every acronym is known by everybody, even in the same profession. There are roughly 157,000 common acronyms listed in the Web data base Acronym Finder

**http://www.acronymfinder.com/**

The effort of memorising only 10 per cent of them would surmount the brain power of most people. The problem has been increased by the fact that a lot of inventive brains with a pathogen tendency to abbreviations keep creating new acronyms every day. Especially Internet freaks have a lot of fun inventing them, always ROTFL (rolling on the floor laughing) while outsiders who receive such messages are just SIFOTSW (sitting in front of the screen wondering).
If you think this is just another indicator for the decadence of our capitalist society, remember the good old days of communism with acronyms like this:
*NIIOMTPLABOPARMBETZHELBETRABSBOMONIMONKONOTDTEKHSTROMONT*
Which means: the Laboratory for Shuttering, Reinforcement, Concrete and Ferroconcrete Operations for Composite-monolithic and Monolithic Constructions of the Department of Technology of Building Assembly Operations of the Scientific Research Institute of the Organisation for Building Mechanisation and Technical Aid of the Academy of Building and Architecture of the USSR (another acronym). To be honest, it is not sure that this acronym is authentic. At least this word monster made it to the Guinness Book of Words as the world's longest acronym. If it incites your competitive spirit, feel free to exceed these 56 letters. The MEB (mess@ge editorial board) awaits your contribution.

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