EURESCOM mess@ge
Issue 1/2005

Ad-hoc networks

Project reports
The significance of WiMAX

European issues
Interview with EU Commissioner Viviane Reding

In focus
ITU T – Global standards

Eurescom Summit 2005
27-29 April 2005
Heidelberg, Germany

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Exploiting the Potential

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Dear readers,

When this editorial was written, many roads in Germany and other parts of Europe were quite slippery due to snow and ice. Until recently this had nothing to due with communications technology. However, ad-hoc networks, our cover theme, are about to change this.

Ad-hoc car-to-car communication could make traffic safer – especially in winter. In our cover theme, we feature an article by Fraunhofer researcher Thomas Luckenbach and an interview with Softlab's Rudolf Mietzner on this subject. Car-to-car communication is, however, just one of the exciting applications, ad-hoc networks offer. The Wireless World Research Forum's vision on ad-hoc networks is presented by NEC's Amardeo Sarma, who had worked a number of years for Eurescom. An introduction by *Eurescom mess@ge* co-editor Uwe Herzog and an article by Portuguese researcher Susana Sargento about the approach of EU project DAIDALOS for integrating ad-hoc networks complete the cover theme.

Innovative network technologies require standardisation to become interoperable. One of the leading standardisation bodies in telecoms is ITU-T. We are proud to present you in this issue an exclusive article by ITU-T's Director Houlin Zhao about the latest trends in global standardisation.

If we talk about location-based services, we usually think of GPS. However, Europe's alternative called Galileo is on its way, offering interesting business opportunities to the telecoms industry. A Tutorial by Volker Vierroth from T-Systems tells you everything you ever wanted to know about Galileo.

If there is something more exciting than Galileo, it is probably WiMAX. Eurescom study WIBAN explored, if the current hype about WiMAX is justified. Saemundur E. Thorsteinsson from Iceland Telecom summarised the results in a concise article.

Currently, the so-called "big dumb network" concept is hotly debated among telecoms R&D people. Read what Eurescom senior manager David Kennedy writes about this concept in our opinion section Viewpoint. As Viewpoint is meant to inspire productive discussions we would like to encourage you to send comments about the article to the editorial team or directly to David Kennedy.

In November 2004, Viviane Reding took office as European Commissioner for Information Society and Media. In an exclusive interview with *Eurescom mess@ge* she revealed her visions and goals for the ICT sector.

We hope you will find something interesting in this issue and would appreciate your feedback on any of the articles. If you would like to suggest a topic or offer a contribution for *Eurescom mess@ge*, this is equally welcome.

Enjoy reading this issue.

Your
mess@ge editorial team
message@eurescom.de

Events calendar

2-7 April 2005

CHI 2005
Conference on Human Factors in Computing Systems – Portland (Oregon), USA
www.chi2005.org/

4-6 April 2005

Global IPv6 Summit in China 2005
Beijing, China
www.ipv6.net.cn/summit/2005/index_en.jsp

27-29 April 2005

Eurescom Summit 2005
Ubiquitous Services and Applications
Heidelberg, Germany
www.eurescom.de/summit2005

8-13 May 2005

3rd International Conference on Pervasive Computing
Munich, Germany
www.pervasive.ifi.lmu.de/

23-26 May 2005

VON Europe 2005
Stockholm, Sweden
www.pulver.com/europe2005

19-22 June-2005

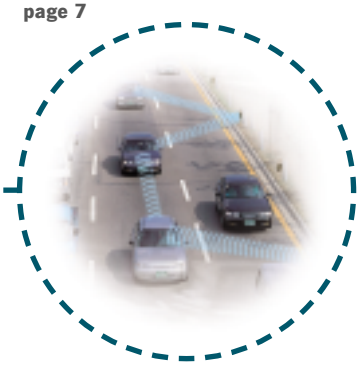
IST Mobile & Wireless Communications Summit
Dresden, Germany
www.mobilesummit2005.org

Sn@pshot

Say it with flowers

Researchers at the University of Warwick have devised a novel way to recycle discarded mobile phones – bury them and watch them transform into the flower of your choice. The University of Warwick team, led by Dr. Kerry Kirwan (photo), have worked with high-tech materials company PVAXX and Motorola to create a mobile phone case which can simply be placed in compost in such a way that just weeks later the case will begin to disintegrate and turn into a flower.

Ad-hoc networks
page 7



ITU T – Global standards for the telecoms sector
page 12

Interview with Viviane Reding about her visions and goals as EU Commissioner for Information Society and Media
page 19

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

Mobile Spam is increasing

Mobile spam has become an increasing problem for mobile phone users and providers. More than 80 percent of mobile phone users regularly receive unsolicited messages. This is the result of a study by the University of St. Gallen, Switzerland, security technology provider Intrado, and the International Telecommunication Union (ITU), which was released in February.

Mobile spam seems to have especially negative effects on the corporate image of mobile operators. Customers are more likely to change their operator than their mobile number to fight the problem. With complaints about mobile phone spam on the rise, both consumers and businesses see wireless operator self-regulation as the most important action against unsolicited mobile messages or spam, according to the study.

The study indicates that mobile network operators are currently well aware of the effects of mobile spam on consumers. However, most network operators are presently in a trial-and-error phase, applying reactive measures and testing various technological alternatives for avoiding spam.

The objective of the study was to analyse differences in the perception of mobile spam issues between consumers and mobile network operators and assess how well the problem is being managed. The study also documents the effects of mobile spam on consumers and network operators and identifies regional variations from Central Europe, North America, and Southeast Asia.

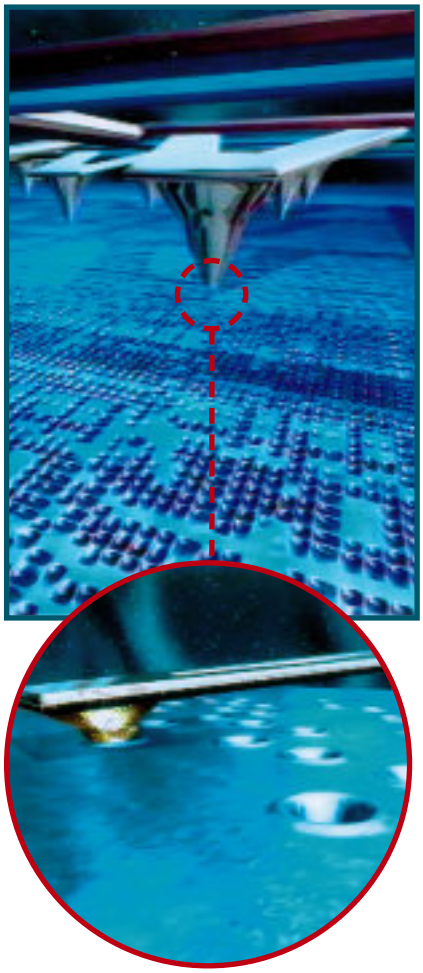
Using a comparative research approach, the study analyzes perceptions based on 1,659 completed consumer surveys and 154 surveys from mobile service company professionals. Conducted in November and December 2004, the study includes results from Germany, Switzerland, Austria, Canada, the United States, Singapore, China, and Saudi Arabia.

www.mobilespam.org

IBM presents Millipede data storage system at CeBIT

At the end of the 1990s, IBM started to work on the Millipede project for a new data storage system with a significantly increased capacity compared to magnetic and optic storage media. In November 2004, researchers at IBM's Zurich Research Laboratory developed a fully functional Millipede prototype, which was presented for the first time to the public at the CeBIT in Hanover, Germany, in March 2005.

The Millipede concept was developed by Nobel laureate Gerd Binnig and his colleague Peter Vettiger. Their concept of a high-density data storage system is based on micromechanical components borrowed from atomic force microscopy (AFM): tiny depressions melted by an AFM tip into a polymer medium represent stored data bits that can then be read by the same tip. This thermo-mechanical



storage technique, IBM claims, is capable of achieving data densities in the hundreds of Gb/in^2 range, well beyond the expected limits for magnetic recording (60-70 Gb/in^2).

When and in which format the Millipede will come to the market is yet unknown.

www.zurich.ibm.com

Consumer worries and lack of knowledge about RFID tags

More than half (55 percent) of 2,000 people surveyed in the UK, France, Germany, and the Netherlands are either concerned or very concerned that RFID tags will allow businesses to track consumers via product purchases, while 59 percent are worried that RFID tags will allow data to be used more freely by third parties. This is the result of a consumer study by consultancy group Capgemini.

According to Capgemini, many of the concerns cited – for example, the belief that tags can be read from a distance (named by 52 percent of respondents) – are unwarranted and probably stem from European consumers' very low awareness of RFID. The survey showed that just 18 percent of European respondents have heard of the technology.

Among those who are familiar with RFID, most view the technology favourably or do not yet have an opinion. Only 8 percent of European consumers currently have an unfavourable perception of RFID.

The majority of respondents said they would buy RFID-enabled products if they meant potentially reducing car theft (70 percent of those surveyed), faster recovery of stolen items (68 percent), and improved security of prescription drugs (63 percent). Additional benefits of RFID identified as important to consumers include improved food safety and quality, faster, more reliable notification of recalls, and faster exit through store checkouts.

The survey by Capgemini was carried out on behalf of more than 30 firms who are seeking to promote the growth of RFID technology.

www.capgemini.com/news/

Public EC consultation on RFID

In January, the EC advisory group for data protection, known as Article 29 Working Party, published a working document on data protection issues related to RFID technology.

The document – Working Document 105 – refers to the basic principles set out in the EC data protection directives concerning the collection of personal data using RFID technology. The paper aims at providing guidance to manufacturers of the technology (RFID tags, readers and applications) as well as RFID standardization bodies on their responsibility towards designing privacy compliant technology in order to enable providers of the technology to carry out their obligations under the data protection Directive.

In a public consultation, interested parties were given the opportunity to submit their comments to Working Document 105 until 31 March 2005.

http://europa.eu.int/comm/internal_market/privacy/workingroup/consultations/consultation_en.htm

Ad-hoc networks
New life for an old concept

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The term ad-hoc networks is certainly not new to most of the readers of *Eurescom mess@ge*. However, there are probably many different associations that people have when thinking of ad-hoc networks. Only ten years ago, they were often seen in relation to military application on battle fields. Seen from a telecoms background, they are often regarded as of little use for the operator business. They rely on network nodes which are not the property of an operator, and it appears to be impossible to provide reliable services with a guaranteed quality through them.

Moreover, there seems to be not much room for generating revenue with this technology. Even worse, some people believe ad-hoc networks might threaten operators' business. However, the picture is not that black-and-white: recent technology advancements and prospective applications can give new life to ad-hoc networks

Definition of ad-hoc network

There is no unique definition what an ad-hoc network is, but one which describes the subject very well was formulated by the IETF work group on Mobile Ad-hoc Networks (MANET): "A mobile ad hoc network is an autonomous system of mobile routers … connected by wireless links – the union of which form an arbitrary graph. The routers are free to move randomly and organize themselves arbitrarily; thus, the network's wireless topology may change rapidly and unpredictably. Such a network may operate in a standalone fashion, or may be connected to the larger Internet."

How they work

To give a very simple example, let us assume that there is already a small ad-hoc network in place. When a new node – in this example it can be the PDA of Tom – joins the ad-hoc network, there are a number of things to do: The device needs to set up contact to other nodes in range, telling them: "I am here". By this, the new node learns who the neighbour nodes are, and vice versa. Another point is that the new node, in this example the PDA, needs a unique identifier to make it addressable – an IP address in IP networks. For all this, the new node is on its own, as there is neither a central controlling entity nor a pre-existing fixed infrastructure in ad-hoc networks. When Tom wants to send a message from his PDA to that of Maria, other nodes serve as a relay station in a process called multi-hop routing, if the PDA of Maria is not in direct reach, using one of the routing protocols designed for ad-hoc networks.

This small example shows a few imminent advantages of ad-hoc networks: They can extend the range of the wireless technology in use, e.g. WLAN or Bluetooth, they can reduce the node's power consumption due to a lower transmission power required, and they increase the node's mobility. To make this work, though, ad-hoc networks require a critical mass of well-behaving nodes, willing to forward other's traffic.

Is there a future for mobile ad-hoc networks?

Ad-hoc networks have already been specified in the early seventies, but there has not been a commercial breakthrough since then. Nevertheless, ad-hoc networks have received an increased attention recently. For example, among the topics where papers could be submitted to this year's IST Mobile Summit, the area of ad-hoc and sensor networks has received the highest number of submissions. One reason for the current uptake of ad-hoc networks are certainly the great advances in wireless technologies over the last years. Examples are the IEEE 802.11 series (many DSL users have their own hot-spot at home), the recent 802.16 WiMAX specification, which enables a significantly larger range of up to 10 km, or Bluetooth for shorter distances. Another focus of current research are 4G mobile networks. 4G networks aim at integrating the various access and network technologies in order to implement ubiquitous services. Ad-hoc networks are one piece of this concept.

Application areas

There are a number of application areas for ad-hoc networks. The cover theme articles in this issue will provide insights into a few selected application areas and research activities. The following overview should give you an idea of the wide range of application areas:

- **Personal Area Networks** (PANs) are formed between various mobile (and immobile) devices mainly in an ad-hoc manner, e.g. for creating a home network. They can remain an autonomous network, interconnecting various devices, at home, for example, but PANs will become more meaningful when connected to a larger network. In this case, PANs can be seen as an extension of the telecom network or Internet. Closely related to this is the concept of **ubiquitous / pervasive computing** where people, noticeably or transparently, will be in close and dynamic interaction with devices in their surrounding.
- **Sensor networks** can be used for environmental monitoring. They can be used to collect various types of data, e.g. temperature, humidity, and vibration. Applications are the measurement of ground humidity for agriculture, forecast of earthquakes, or monitoring the progress of bushfires.
- Ad-hoc networks formed by users near a hotspot could **extend that hotspot's coverage**. Hotspot coverage is often limited in densely built areas. Their extension would enable other users to get access even if they are not in direct reach. Going a step further, also other systems, for instance UMTS cells, could be extended beyond their range. This idea is not that absurd if one remembers the numerous white spots (small areas with no reception) on the GSM coverage maps still existing today. A crucial prerequisite for this, however, is the availability of suitable authentication, accounting, and charging mechanisms to ensure revenues for operators.
- **Automotive networks** are widely discussed currently. Cars should be enabled to talk to the road, to traffic lights, and to each other, forming ad-hoc networks of various sizes. The network will provide the drivers with information about road conditions, congestions, and accident-ahead warnings, helping to optimise traffic flow.
- Last but not least, **military applications** should be mentioned. They exploit the ability of ad-hoc networks to work in situations where there is no pre-installed infrastructure available, as in combat areas. **Rescue operations** in remote areas would also be facilitated.

To conclude, ad-hoc networks have the potential to become a serious part of tomorrows 4G communications networks. They can open up new business opportunities for network operators and service providers. However, there are still a lot of technical challenges that need to be solved in order to guarantee a certain service quality and to enable charging of service usage.

Self-organisation in wireless systems – the WWRF approach

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A short look around shows the increasing diversity of smart and connectable devices users have to cope with. Embedded devices and sensors with basic wireless facilities potentially extend the available infrastructure. Applications span body, personal, home, vehicle, and wide area networks. This leads to the question how users can deal with this increased complexity without having to become technical experts. The solution could be self-organisation.

The basic idea of self-organisation in the wireless area is to build on existing concepts, such as plug-and-play components, auto-configuration in the Internet and ad-hoc networking, but also to go beyond. The concept of self-organisation is found in physics, chemistry, evolution, economics, and ecology, while its potential is not yet exploited in technological systems. The task at hand is to learn from other domains and develop a new category of solutions for technological problems in wireless world systems. Most of the actual research work in this embryonic field lies ahead of us.

Challenges in self-organisation

Most definitions of self-organisation imply a property of systems or sets of objects that leads to increased order. This order can only be local or related to a portion of the real world, as the laws of thermodynamics make it impossible to increase order globally. Self-organisation can either be the natural, emergent property of complex systems, such as the evolution of life and the organisation of packs of wolves, or the result of imposed properties or rules on artefacts or technological systems, for which auto-configuration in IPv6 and plug-and-play systems are examples. The latter requires human intervention in the form of defining rules or imposing properties on systems or objects.

The challenge is twofold. First, can we further develop self-organisation concepts already available in the communications field? Second, can we learn from natural systems and other fields and apply their properties and concepts to technological systems?

Reducing human intervention

Self-organisation aims to bring orderliness to the evolving distributed systems with the least possible necessary human intervention. The following constraints apply to self-organisation:

- The system should behave as the user expects, and the user should remain in control at some higher level and be able to correct erratic behaviour.
- The system should not compromise the privacy of the user and have adequate security mechanisms. It will be essential for the user to trust the automated behaviour of systems.

Both user and technical requirements of self-organisation need to be understood. The human being must be seen as part of the overall system. All levels or layers, such as physical, network, middleware, and application, are potentially affected. The following figure shows a generic approach to the problem (see figure).

Self-organising systems need built-in policies and learning properties. They need to be able to change and optimise the concrete behaviour based on more abstract input from users and administrators as well as use experience or feedback from the environment.

WWRF Special Interest Group on Self-Organisation

In 2003, the Wireless World Research Forum (WWRF) reorganised its working structure and introduced three horizontal Special Interest Groups. One of these was SIG3, the Special Interest Group on Self-Organisation in Wireless World Systems. The SIG area includes concepts of self-learning, expert systems, chaotic theory, and fuzzy logic. A specific goal is a generic control plane to configure, operate, and manage a distributed communications infrastructure in the Beyond 3G area. Overhead from self-organisation should be minimised while optimising performance, efficiency, and reliability. Policy-based approaches will be a starting point. Adapting and learning-enabled rules and policies will allow interactions to be moved to higher and more human level.

Examples of other specific items identified are:

- Self-configuration of attached devices and networks
- Self-organising, adaptive, context-aware applications, services & middleware
- Self-organisation in ad-hoc networks
- Self-organisation of trusted groups with specific rights
- Self-organisation capabilities of ad-hoc radio interfaces
- Self-adaptation to normal and disruptive or catastrophic changes
- Automatic adaptation of protocols and software
- Self-organising key management

SIG3 is about to complete the first white paper on the state-of the art in self-organisation. It has three specific Internet examples: IP auto-configuration, peer-to-peer networking, and shared open-content Web pages. Another item is self-organisation in emerging ad-hoc and sensor networks, with examples on paradigms to achieve cooperation and distributed topology control. Theoretical foundations and tools for self-organisation in networks, such as game theory and random graph theory, are presented as a possible basis of work. The white paper also proposes a mobile, wireless networks and services architecture with a high level of self-organisation.

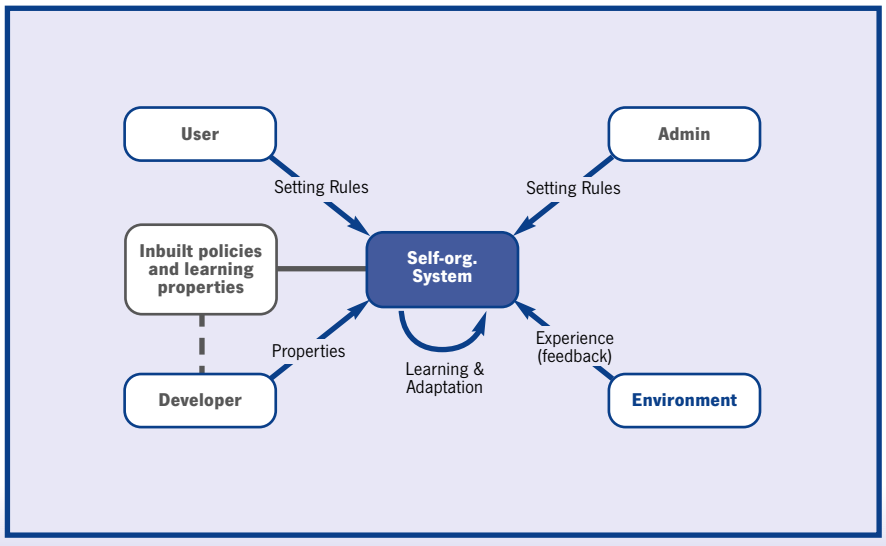

Figure: A generic approach to self-organisation

Conclusion

Self-organisation is an embryonic area in the domain of wireless world systems. There is significant potential both from initial concepts of self-organisation in the field as well as from other established areas of science and nature in general. The WWRF has taken up the issue and established a Special Interest Group to deal with the area. The challenges are enormous, and a lot of research lies ahead of us.

Further information is available on the WWRF website at

www.wireless-world-research.org

The author is Chairman of WWRF SIG 3 "Self-Organisation in Wireless World Systems".

Communicating cars
Ad-hoc networks on wheels

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Ad-hoc communications has many different flavours: ranging from self configuration, load balancing and task distribution in sensor networks up to cooperative driving between communicating cars on the road.

Cars being able to communicate with other cars and with their environment could not only help to avoid crash situations and to save lives on our streets but could also significantly improve the comfort and efficiency of driving with respect to time and energy.

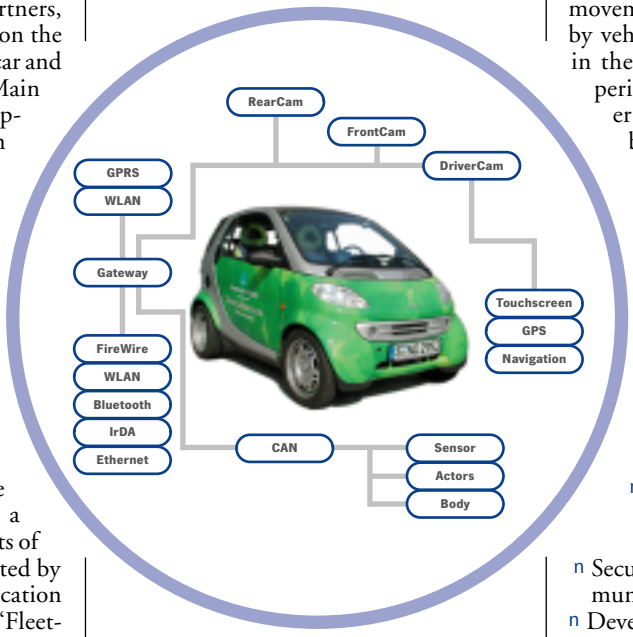
For about five years, FOKUS has been working together with industrial partners, car manufacturers, and universities on the different technical aspects of car-to-car and car-to-roadside communications. Main aspects of the research and development for vehicular networks are in the development of protocols and security mechanisms for trusted ad hoc communications, usage of standardized transmission systems like 802.11 in ad hoc mode and with geographic addressing and routing.

In order to successfully introduce car-to-car communication, the development of suitable application scenarios in different areas like convenient driving, intelligent telematics, or active safety have to be carefully planned and merged into a deployment strategy. Significant parts of the research work have been supported by the German Federal Ministry of Education and Research (BMBF) within the "FleetNet – Internet on the Road" project (2000 – 2003) and within the ongoing NoW project (Network on Wheels, 2004 – 2008).

In order to end up with a globally accepted solution for the transmission system, which will be based on a licence free radio frequency in the 5GHz range, the North-American developments in the area of dedicated short range communications (DSRC) will be taken into account for ongoing developments. Furthermore, a close cooperation between the European Car-2-Car Communication Consortium (C2C CC) and the NoW project is being established in order to promote the project results towards European standardization.

As a "proof of concept", a demonstrator has been developed by project partners, which is based on a fleet of Smart™ cars especially equipped with touch screen displays, cameras, 802.11a/b interfaces, and antennas.

Additionally, these cars provide access to the car-internal controller area network (CAN) bus and to the GPS system in order to allow the development of remote maintenance services as well as the implementation of location-dependent applications.



One of these applications is the location based pinboard application (LBPA), which has been developed by FOKUS. LBPA is used to distribute messages (pinboard messages) in a predefined region using geographical addressing and a store-and-forward mechanism that relies on vehicle movement. These messages are generated by vehicles (mobile or stationary), stored in the vehicular network for a specified period of time and are accessible by other cars in specific areas of validity. The basic idea of LBPA is to provide an interactive means for the exchange of information between cars/drivers in a specific area of interest – like an electronic bulletin board.

Some of the main technical issues still to be worked out with respect to high velocity vehicular ad-hoc networks are:

- The development of position-based routing and forwarding protocols
- Adaptation of communication protocols to real-world car networking environments
- Security aspects and trusted ad-hoc communications
- Development of suitable antenna designs for car-to-car communication

For more information see
www.network-on-wheels.de
www.et2.tu-harburg.de/fleetnet/
www.car-to-car.org/

Safer traffic

Interview with Rudolf Mietzner from Softlab/BMW Group

Rudolf Mietzner

One of the most exciting application areas for ad-hoc networks is the automobile sector. Ad-hoc network expert Rudolf Mietzner told *Eurescom mess@ge* in an exclusive interview what the opportunities and challenges of "talking cars" are. Mr Mietzner is Principal Consultant Telecommunications and CRM at Softlab GmbH, which belongs to BMW Group, Munich.

How can ad-hoc networks be used in the automobile sector? What are the application areas?

Mietzner: Ad-hoc technology will be used in the near future as an additional feature in the car's onboard communications unit in order to send real-time messages between cars. This car-to-car communication could be used on highways to assemble car convoys managed by the ad-hoc technology. Connecting cars to an ad-hoc network could be used for several applications.

Areas of application include services like safety warnings, traffic information, and real-time information on road-conditions.

What are the technical challenges of ad-hoc networks with cars?

Mietzner: There are three main challenges: security, speed, and data flow. Concerning security, the main task is to protect ad-hoc networks from spam and fraud. The second challenge is to achieve that the ad-hoc technology still works without interruptions while driving at high-speed. Finally, a number of technical challenges have to be addressed in order to enable a smooth flow of information between cars.

How secure are mobile ad-hoc networks?

Mietzner: At the moment, security in ad-hoc networks is low or not existent. Research efforts are being made, for instance by EU project DAIDALOS, in order to increase the security of ad-hoc networks.

In which way will ad-hoc networks change traffic?

Mietzner: Ad-hoc networks will significantly change traffic. Driving will become much safer and more convenient. Ad-hoc networks will help to reduce stop-and-go situations in the city and reroute the traffic when necessary. In addition, ad-hoc networks will help to prevent accidents and to reduce traffic jams.

When will we have ad-hoc networks on European streets?

Mietzner: The technology is just emerging and not yet mature enough. Plenty of research and standardisation still needs to be done. However, I expect ad-hoc networks to be a reality on the streets within the next five to ten years.

What is being done to ensure user privacy, avoiding abuse of his movement profile?

Mietzner: We regard data protection and privacy as a key to the success of ad-hoc networks and therefore dedicate significant development work to this area. Some concepts are already defined but not finished yet. Due to the sensitive character of this issue, I cannot reveal any technical details at the moment.

How can ad-hoc networks make driving safer?

Mietzner: It will help to reduce accidents. For example, if a car is driving along an icy road, sensors in the car will detect and classify this as a dangerous situation, which will trigger programmed counter-measures by the car's road safety system. Nearly at the same time, the car's onboard unit will send a message to other cars around this area, giving the exact location of the icy part of the road. The other cars will receive this message in real-time, allowing them to reduce the speed or take other roads in order to avoid the dangerous situation.

What will the payment models for ad-hoc network services look like?

Mietzner: Normally the service will be for free in case of warning messages, but in other cases the payment models could easily adapt to existing models in the mobile communications area. The payment could be based on events – events already established as payable items comparable to SMS.

The interview was conducted by Milon Gupta.

Integration of mobile ad-hoc networks
EU project DAIDALOS

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A major challenge for future networks is how to ubiquitously provide access to an unlimited set of IP based services at reduced costs for the users and providers. One response to this need is the emergence of numerous hotspots all around the globe. This evolution is profitable for providers, who can increase their revenues, and beneficial for users, who can connect to the Internet with high bandwidth. Due to the small coverage area of a WLAN hotspot, ad-hoc networks can be an interesting supplement. They can increase the covered area without infrastructure investments by an operator. The flexibility introduced by the multi-hop characteristics of mobile ad-hoc networks makes them especially suitable to provide increased radio coverage at low cost.

EU project DAIDALOS aims at seamlessly integrating heterogeneous network technologies that allow network operators and service providers to offer new and profitable services – voice, data, multimedia. The integration of mobile ad-hoc networks is also one of the main DAIDALOS work items. Ad-hoc networks in DAIDALOS are not considered as stand-alone networks, but as a means for extending the radio coverage of wireless broadband systems. Therefore, DAIDALOS addresses the main aspects of the integration between ad-hoc networks and managed operator networks.

Integration of functionalities

The delivery of services to users in an ad-hoc network, with features like QoS, security, authentication, authorization and charging, requires several functionalities in the ad-hoc network and integration strategies:

- Discovery of a gateway to an operator network to obtain a unique IP address and efficient routing mechanisms to support the mobility of users inside the ad-hoc network with minimal overhead. Moreover, since mobility is a key aspect of next generation networks, the ad-hoc architecture should support handovers of mobile ad-hoc user terminals (nodes) between different ad-hoc networks. This handover procedure will be significantly different from handovers in mobile operator networks, because the control information exchanged in ad-hoc networks needs to be minimised.
- QoS support in terms of differentiation, admission control, and recovery from congestion situations. Due to the mobility of ad-hoc users, whose terminals form the connectivity backbone of ad-hoc networks, and due to the absence of a central node with knowledge of the network resources, QoS support is a major challenge in ad-hoc networks. Therefore, QoS needs to be realised in a distributed way, with mechanisms for fast reacting to the mobility of the nodes.
- Security mechanisms must guarantee that only authorised users can access the ad-hoc resources and the services in the operator's managed network. Eavesdropping as well as modification of the transmitted data must be prevented.
- Charging and rewarding of mobile ad-hoc nodes. An essential issue in ad-hoc networks is the requirement for mobile nodes to cooperate in traffic forwarding. A basic economic idea aims to provide some rewards to nodes that correctly forward data packets. Due to the dynamic nature of ad-hoc networks and the requirement of the knowledge of the overall path in the rewarding process, charging and rewarding is a challenging task.

Conclusions

The integration of ad-hoc networks into operator environments is currently a hot topic. Its success will strongly depend on the existence of a significant interest of both users and operators. Users must be attracted by the variety of services or cost advantages that ad-hoc networks can bring them, and they should be prepared to provide their mobile terminal for setting up the network. Operators must find their part in the value chain, as the revenues can be very high.

Further information is available on the DAIDALOS website at
www.ist-daidalos.org

DAIDALOS is an Integrated Project under the EU's Framework Programme 6.

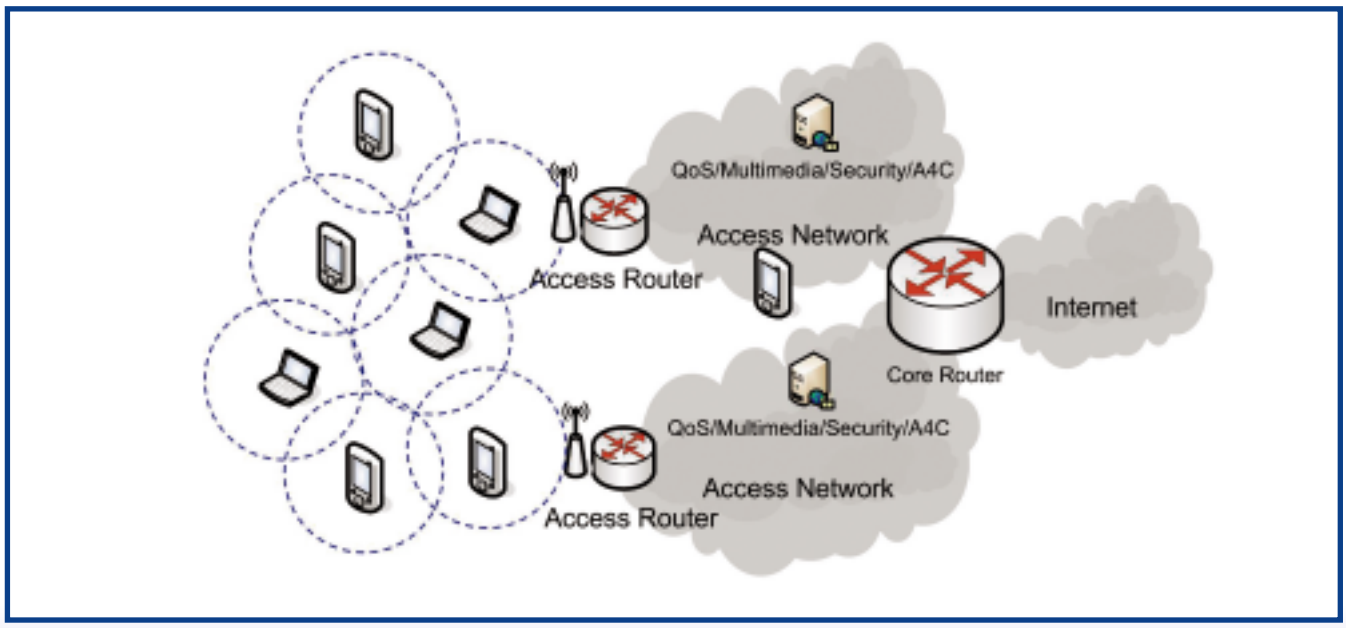

Figure: Ad-hoc network architecture

ITU T – Global standards for the telecoms sector

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When global strategy consulting firm Booz Allen Hamilton announced the winners of the award for the world's top ten most enduring institutions in December 2004, the International Telecommunication Union (ITU) was among them. [1] The organization, founded in 1865, was honored for its effective information flow as well as the ability to reinvent itself time and again and remain market leader in its field.

With a majority of its membership from the private sector, ITU's standardization arm – ITU T – understands the crucial balance between rapid delivery and stability in standards development. Over the last decade, it has dramatically overhauled its standards-making, streamlining approval procedures and cutting development time by as much as 95 per cent. [2] This means that an average standard, which took around four years to develop 10 years ago, can since 2000 be approved in as little as eight weeks for technical standards and nine months for Recommendations having policy or regulatory implications. At present, more than 2900 ITU T Recommendations are in force with around one new Recommendation produced every day.

ITU T Recommendations

These international standards – ITU T Recommendations – are defining elements in ICT infrastructure. It is difficult to understate the importance of standardization. Whether we exchange voice, data or video messages, communications cannot take place without standards linking the sender and the receiver: SS7, E.164, JPEG, MPEG, H.323, TCP/IP, GSM, ADSL etc. The telephone network, arguably one of the most complex projects ever undertaken, is based on a myriad of standards, and ITU's work was instrumental in its creation.

Topics currently under research by ITU T's study groups cover a wide range of issues from service definition, numbering, routing and global mobility to telecommunication management networks, optical networking technologies, frame relay and IP interworking. They also include communication system security, intelligent networks, access network transport, languages, description techniques and multimedia services and systems. Today's work extends beyond the traditional areas of telephony to encompass a far wider range of information and communications technologies.

ITU-T headquarters in Geneva (in the front)

Key area NGN

Next generation network (NGN) is a key area of study for ITU T's study groups. The convergence between internet protocol (IP), public switched telephone network (PSTN), digital subscriber line (DSL), cable television (CATV), wireless local area network (WLAN) and mobile technologies is a task that many believe is impossible without the development of global standards.

NGN work in ITU T was kick-started using a mechanism called the Focus Group that met first in June 2004. The Focus Group concept allows urgent standardization needs that are not addressed within the existing ITU T structure to be addressed quickly and with the minimum of red tape.

In ITU T many of the Study Groups have an NGN element to their work, with the lead coordinator Study Group 13. Additionally study groups 2, 9, 11, 16 and 19 have significant NGN focus. The recently founded 'joint coordination activity' (NGN-JCA) will ensure that work across ITU T's study groups is focused on delivering NGN standards in a timely and efficient way. The group will aim to see that standards are developed in the most appropriate place and that no duplication of effort occurs.

In its first meeting of the new study period, Study Group 13 started work on a set of activities to speed up the development of, and provide clear direction for NGN standardization work. ITU T will implement in the first half of 2005 'the NGN project management tool' that will give a unique overview of the next generation network (NGN) work going on across the standardization world.

Since the work towards standards for NGN is taking place across a number of different ITU T study groups and other standards development organizations (SDOs) the ability to coordinate and view all NGN work in one place will be invaluable to the swift and efficient publication of the first set of NGN specifications (Release 1).

The tool – essentially a repository of information from ITU and other SDOs – was asked for by members of the NGN Focus Group. Key will be the ability to keep track of the latest versions of documents and provide detailed information for experts and summaries for management.

In December 2004, the NGN Focus Group delivered its first output for inclusion in the first set of specifications for NGN – Release 1. The document (a supplement to ITU T's Q series recommendations, approved at the last Study Group 11 meeting) relates to IP-QoS signalling. QoS signalling provides a way for network elements to communicate with, or signal, other elements to request special handling of certain traffic. QoS signalling is useful for coordinating the traffic handling techniques provided by other QoS features. It plays a key role in configuring successful end-to-end QoS service across a network. In this case the document – a technical report – identifies the requirements for signalling information regarding IP-based QoS at the interface between the user and the network (UNI) and across interfaces between different networks (NNI) including access networks. Identifying these requirements and the signalling information elements will enable the development of signalling protocols which are essential for the development of services based on IP-QoS in NGN.

Cyber security

Cyber security and Internet governance are other important topics that members have asked ITU T to concentrate on in the coming years. Recently, I presented a paper outlining my vision for ITU's role in future

Internet governance. [3] In this paper presented to the ITU Council Working Group on WSIS, I outline why I believe that ITU along with other key players has an important role to play. I believe that people are troubled by the current lack of consensus over who should do what. Particularly at the international level, I think that everybody would benefit from a more coordinated approach on Internet and IP-based services.

Inclusion of developing countries

Bridging the digital divide between rich and poor countries is another important field of work for ITU T. Last fall, the World Telecommunication Standardization Assembly (WTSA) in Florianópolis gave a corresponding mandate to all ITU T study groups. Consequently, many study groups have drawn up draft action plans to support the involvement of developing countries and countries with economies in transition in its work. Typically these plans will ensure that developing countries' needs are taken into account in the development of standards. Several study groups have included in their studies the specific requirements of these countries. In order to do this, the group will seek to better engage experts from these areas, and organize workshops there. Additionally it was agreed that development work could start on handbooks and guidelines specifically addressing developing countries' needs.

ICT and the automotive sector

Workshops have long been a popular way of progressing existing work areas and exploring new ones. These events augment the work of the study groups by proposing new topics and involving non-members and other standards developers in their work. Most recently, ITU T ran a workshop focusing on the synergy between the information and communication technologies (ICT) and automotive sectors during one of the world's largest automobile events, the Geneva Motor Show. The three-day event brought together leading players in the field and attendees from car and systems manufacturers. During the sessions topics such as the need for consensus between the public and private sectors and business models for interlinking the car and telecom businesses were discussed. Technically oriented sessions examined topics such as telematics and diagnostics, safety, the integration of in-vehicle systems with existing and future telecommunications infrastructures.

The way ahead

2005 will see workshops on cyber security, NGN, telecommunications and disaster relief, video and image coding and processing and home networking.

2005 will also see the setting up of a technology watch function. In order to remain at the cutting edge for standardization, the group will survey key areas of ICT in order to capture new topics for the future work of ITU T's study groups.

To remain at the forefront of worldwide ICT standardization, and in order to attract those ICT players not involved in our work, particularly those in small and medium enterprises, promotion plays an important and necessary role. That is promotion of the concept of global standards and promotion of the work of ITU-T.

Further information

An easy way to find out more about ITU T's ongoing standardization activities is to subscribe to its monthly newsletter, the e-Flash. You can find an archive of the previous versions of the e-Flash as well as subscribe here: http://www.itu.int/ITU T/e-flash/index.html

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[1] *http://www.boozallen.com/bahng/SilverDemo?PID=Home.html&contType=TABLE&dispType=HTML*

[2] This fast-track approval procedure for technical standards is entitled "Alternative Approval Process (AAP)". More information on the AAP can be found here: *http://www.itu.int/ITU-T/aap/index.html*

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Viewpoint

It might be big, but it will never be dumb

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There is a myth in telecommunications companies today – partly promoted by the newly integrated IT guys – that the most economical way forward for networks is for the whole network to evolve into a "big dumb network". This "big dumb network" concept means that there is an IP transport cloud in the network picture and everything else resides on the periphery of this cloud. The theory is that this cloud can have sufficient capacity thrown at it to keep all traffic flowing without congestion or problems.

Well, just as there never is a free lunch, there will never be a big dumb network – at least not unless there are big dumb operators.

Any network has costs and maintenance requirements. Networks need performance statistics to know which parts are working and which parts need attention. Traffic planning and data are needed to justify investments. Measurable quality parameters are needed to support service level agreements. These things are not possible with dumb networks.

It's time for us to see things for what they are. Networks must support business requirements. IP networks were never designed to support commercial commitments, so we should stop saying we'll move everything to a big dumb network.

Many experts say it will work if we have mechanisms to distinguish real-time traffic from other traffic and give it priority. This might help a little, but it is still going to fail when there is a high load of real-time traffic with the same priority level. The lower priority traffic will also have to be delivered in a reasonable time, so delaying it to give voice, for example, priority can only be a very short-term solution.

Other solutions involve stacking protocols upon protocols (diffserve, RSVP, etc.) in an attempt to make a best effort tech-

nology act like reserved capacity connection network. Routing will be used to make throughput more reliable and support reciprocal traffic handling agreements. Traffic recording will be used to verify billing. We'll soon be doing all the network management functions that we currently perform for switched networks. So why do we think we can take the intelligence out of the network?

A critical step for the immediate introduction of NGN services will be an open discussion on how much intelligence will actually be in the network – a big clever network – and where it should be located. Then, how this intelligence can be used to seamlessly support issues like NGN roaming, consistent inter-domain SIP handling and (inter-domain) QoS must be considered. These are time critical issues, as purchasing decisions for NGN equipment are now under way.

A major re-think of how to use and manage IP networks and protocols is long overdue. Current enthusiasm for IP networks exceeds the ability of these networks to deliver large-scale high-quality reliable services. This exercise must be performed if large-scale high-cost errors are to be avoided. We want to move the mass-market voice telephony to IP networks as this will allow us to open up the rich multimedia service market, but we want to do it right.

So, beware of anyone saying a big dumb network is the way forward – they probably don't have experience of real-world network provision and management.

Clever operators will implement clever networks.

Personalised services on the move

Impressions from the first public DAIDALOS workshop

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DAIDALOS is an Integrated Project under EU Framework Programme 6. The abbreviation stands for Designing Advanced network Interfaces for the Delivery and Administration of Location independent, Optimised personal Services. DAIDALOS is about radically improving the usability of European telecommunication technologies by integrating mobile and broadcast communications. Following a user-centred scenario-based approach, DAIDALOS will deliver ubiquitous end-to-end services across heterogeneous technologies.

Patrick Robertson, DLR, demonstrates the challenge of discovering and managing composed services in pervasive systems. The demo shows how his mobile phone automatically discovers a large screen in the room he is entering. By pressing a button he agrees to display the photo currently on the display of his mobile on this larger screen.

About 100 participants attended the workshop at Stuttgart University and learned about the innovative topics DAIDALOS is currently working on.

The workshop triggered significant media interest. Live reports with interviews from the workshop have been broadcasted on German radio stations Deutschlandfunk and SWR1 The photo shows an interview with Hans-Jörg Vögel from BMW Group. Newspaper and magazine articles have been published in Stuttgarter Zeitung, Markt & Mittelstand, and Computerwoche.

Twelve months after the project start, first results were presented to the public in a workshop held in Stuttgart on 14 December 2004. About 100 participants learned about innovative topics that DAIDALOS is currently working on in order to realise the two scenarios targeted by DAIDALOS: Automotive Mobility and Mobile University.

A major element in achieving these scenarios is the integration of heterogeneous access networks. This includes, for example, UMTS, Wireless LAN, and Digital Video Broadcast Terrestrial (DVB-T). Other aspects addressed at the network level are router discovery, handover, security issues for terminal mobility, and QoS.

A major component is the DAIDALOS Service Provisioning Platform. It will provide transparent access to the various network types. Besides enabling Services and Network Management this will also ease the development of end user applications.

First results of the large implementation activities have been shown at this workshop, too. In ten technical demos, experts presented their work on ad-hoc network integration, user authentication using PANA, content adaptation, and more.

A list of all demos and the presentation slides are available at:
www.ist-daidalos.org/events.htm

Amardeo Sarma from NEC explains the advanced mobility and security features required for integrating heterogeneous networks.

Rui Aguiar from ITAv, explaining that the DAIDALOS architecture is a set of technology modules and their interoperation mechanisms, which can be adapted to any business scenario under consideration in the project.

The video which was watched on the home PC – and suspended when leaving the house – is continued on the car's screen. Authentication is automatically done, thanks to the token integrated in the car key.

The BMW demonstration of authentication and a video-session handover attracted most of the attention. The access technology used to receive the video in the car is Digital Video Broadcast – Terrestrial (DVB-T).

The significance of WiMAX
Eurescom study WiBAN

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If you rely on the trade and business press only, then WiMAX is very hot – as IEEE Spectrum columnist Steven M. Cherry pointed out in his article about a year ago. According to the expectations, tens of Megabits/s could be transferred over distances up to 50 km. A heading in the September 2003 issue of IEEE Spectrum said: "Entangled in their copper wires, phone companies may miss out on the broader broadband revolution". Obviously, there was a need to dive into the subject. What better platform was there than Eurescom? A Eurescom study called WiBAN (WiMAX in Backhaul and Access Networks) was kicked off in September and finished in early January 2005. According to the study results – and supported by a recent Economist article – WiMAX is really cooling off these days.

WiMAX (World interoperability for Microwave Access) is a wireless technology mainly designed for bridging the last mile to the end user and providing him with a broadband connection. WiMAX is based on standards developed by IEEE and ETSI, notably the IEEE 802.16 range of standards and the HIPERMAN standards. WiMAX can be used in different frequency bands in the range 2-66 GHz. It is claimed to be useful for urban, suburban and rural areas, sometimes with a non line of sight condition between base station antenna and subscriber station antenna. Intel has announced that they will start building WiMAX chipsets into laptop computers already in 2006.

WiMAX is not to be confused with Wi-Fi. The former is a metropolitan area networking technology whereas the latter is designed for local area networking. With WiMAX, nomadic users can be served, for instance, while they are stationary or when they have a walk during a communications session. A WiMAX area served by one base station is termed "Hot zone" because it is considerably larger than a Wi-Fi service area called "Hot spot". A combined usage of WiMAX and Wi-Fi is possible as depicted in the figure. There, an example is shown where Wi-Fi is used to extend the WiMAX coverage into a building or to a hot spot. Mobile operation of WiMAX is not yet standardised, but such additions to the standards are in preparation. The mobile standards are expected to be published in July this year.

The WiBAN study

The study was a collaboration between five Eurescom members: Síminn, Telenor, Eircom, Portugal Telecom and Matáv. In the study, a techno-economic analysis of WiMAX was performed for several different scenarios. Those included usage for the drop segment in urban, suburban and rural areas as well as using WiMAX for backhauling other systems such as 2G/3G base stations, Wi-Fi hot spots and other WiMAX base stations. In addition, technical characteristics of WiMAX were analysed and compared to other wireless and wired technologies. Finally, regulatory aspects such as frequency licensing were investigated.

Technical characteristics of WiMAX

WiMAX is based on well-designed and thoroughly calculated standards, contrary to e.g. Wi-Fi. In the physical layer, OFDM (Orthogonal Frequency Division Multiplexing) is applied in the 2-11 GHz frequency range, which makes WiMAX signals resistant to multipath effect and selective fading. The standards have means to provide quality of service (QoS) guarantees, which is extremely important for real-time services such as telephony. Security issues are treated by authentication and encryption mechanisms. WiMAX is usable in both licensed frequency bands and licence exempt bands. The most important frequency bands for WiMAX usage in Europe will be the 3,5 GHz and 5 GHz bands. The system design encompasses advanced concepts such as adaptive modulation where the system is able to apply different modulation methods depending on the communication link signal to noise ratio. Spatial diversity techniques and adaptive antenna systems are available to the WiMAX system designer. This enables signals from multiple antenna elements to be coherently combined to concentrate the transmission or reception to a particular direction or directions. Mesh networking is an interesting feature where a subscriber station is able to relay signals to and from other stations that do not have a direct contact to the base station. With this, the range can be extended and coverage holes be filled.

WiMAX usage

WiMAX will be used in urban, suburban and rural areas, particularly where other broadband means are not available or installations are expensive. Competition to DSL will not be fierce in areas where DSL is already established due to relatively low DSL costs and high penetration. Furthermore, a high density of WiMAX base stations will be needed in urban and suburban areas to be able to serve customers with self-installable CPE and reasonable data rates. In fact, the cell sizes under those conditions are only a few hundred metres. WiMAX is likely to play an important role in serving rural areas. There, cell sizes of 5-10 km are possible, requiring outdoor antennas at the customer premises. The results of WiBAN's coverage estimations are shown in table 1. The service range of a WiMAX base station has been calculated for different conditions in a suburban area. Terrain type A means that the area is hilly with a rather high density of trees. Type C means that the area is flat with a low tree density and type B refers to an area in between. An urban area with long blocks of high rising buildings is a more difficult scenario than terrain type

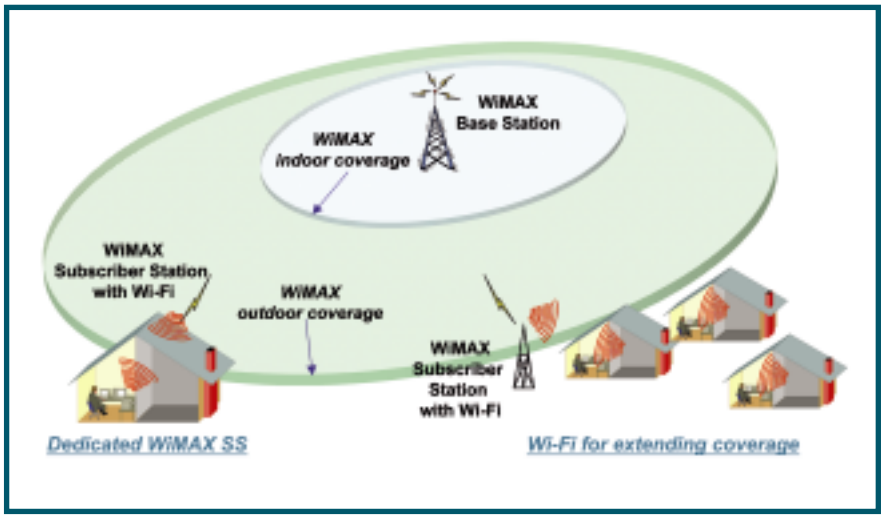

Figure: Combined usage of WiMAX and Wi-Fi

Environment	Typical cell size	Sector throughput
Suburban terrain type A (NLOS)	0.7 km	11.6 Mbit/s with 7 MHz channel
Suburban terrain type B (NLOS)	1.2 km	11.6 Mbit/s with 7 MHz channel
Suburban terrain type C (NLOS)	1.7 km	11.6 Mbit/s with 7 MHz channel
Suburban OLOS	4.7 km	11,6 Mbit/s with 7 MHz channel
Line of Sight	10 km	11,6 Mbit/s with 7 MHz channel

Table 1: Practical performance values for different terrain types

NOS means Non Line Of Sight

OLOS means Optical Line Of Sight, which means that the radio wave path is obstructed althrough the transmitting and receiving antennas can "see" each ohter.

Line of Sight means there is an unobstructed path between antennas.

A, as a result of which the range will likely be shorter than 700 m. The figures in table 1 refer to a communications speed of 11,6 Mb/s. This is the total speed available to all users in a particular sector, which they must share. Increasing the speed can only be done by increasing signal strength. For a fixed transmitting power and antenna gain, this means lower range. Thus, ranges are lower if more speed is desired, e.g. for 26 Mb/s the 1,2 km range for terrain type B would drop down to 700 m.

Results of the techno-economic analysis

The business case for WiMAX was analysed for several scenarios, for urban, suburban and rural areas and from the point of view of incumbent and new entrant operators. The analysis was based on a number of assumptions, such as cell sizes, deployment of competing technologies, and subscriber density. The most notable factor was the percentage of ADSL deployment in the WiMAX service area and, thus, the analysis was made for different values of this factor. The results are presented in table 2. The table shows the accumulated cash flow for urban and rural areas with high and low levels of ADSL penetration. The payback rate is not excitingly high and in two of the incumbent cases the project would be in the red during its whole lifecycle.

Conclusion

The analysis performed in the WiBAN project shows that WiMAX is an interesting new technology that offers new opportunities to telecom operators for enhanced broadband coverage and service offering. However, the technology's capabilities and business prospects have been largely overestimated in the press coverage of the subject. WiMAX seems not to be an interesting choice to compete with ADSL in urban and suburban environments but can be used for residual areas that are not easily served by DSL. Likewise, WiMAX is a good candidate for rural areas. Currently, WiMAX-certified equipment is not expected on the market until late 2005, about half a year later than previously expected. The mobile aspects of WiMAX were only marginally covered in WiBAN, and could be the subject of a future Eurescom study in this area.

	Incumbent Operator	New Entrant
Urban, high ADSL penetration	Negative ACF	Positive ACF after > 5 years
Urban, low ADSL penetration	Positive ACF after > 4.5 years	Positive ACF after > 4 years
Rural, high ADSL penetration	Negative ACF	Positive ACF after > 5 years
Rural, low ADSL penetration	Positive ACF after > 5 years	Positive ACF after > 4 years

Table 2: Accumulated Cash Flow (ACF) in different business models

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Galileo

The European satellite navigation system

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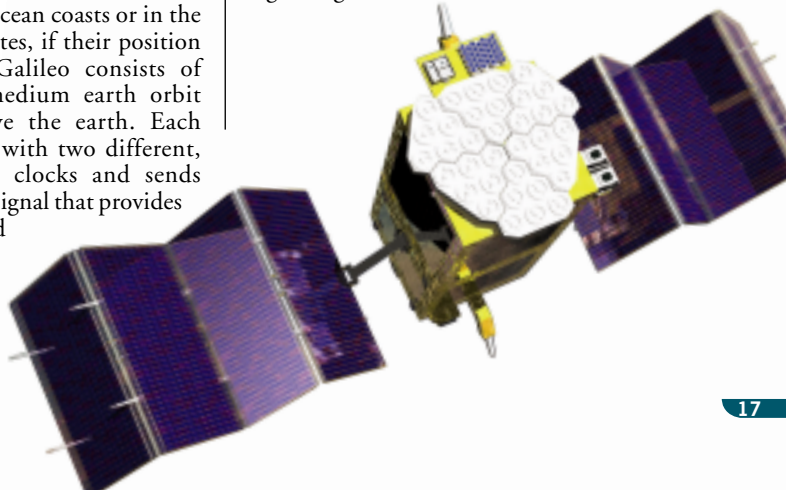
To know where you are is an easy task, it seems, nowadays.
Location information, meaning to know where you are, is valuable. It enables services like navigation, tourism, goods tracking, securing children, and a lot more not so obvious applications. The upcoming European satellite navigation system Galileo will offer this information with an accuracy and reliability not available at present.

How Galileo works

To compute your position on earth, it is basically enough to measure the distance to three known points. This works fine with lighthouses on ocean coasts or in the same way with satellites, if their position is exactly known. Galileo consists of 30 satellites in a medium earth orbit at 23,616 km above the earth. Each satellite is equipped with two different, very precise atomic clocks and sends out a highly accurate signal that provides one of the needed pieces of location information.

The user's device receives this signal from at least three satellites and computes its position with an accuracy of 10 – 45 cm. Figure 1 gives an overview of the scenario.



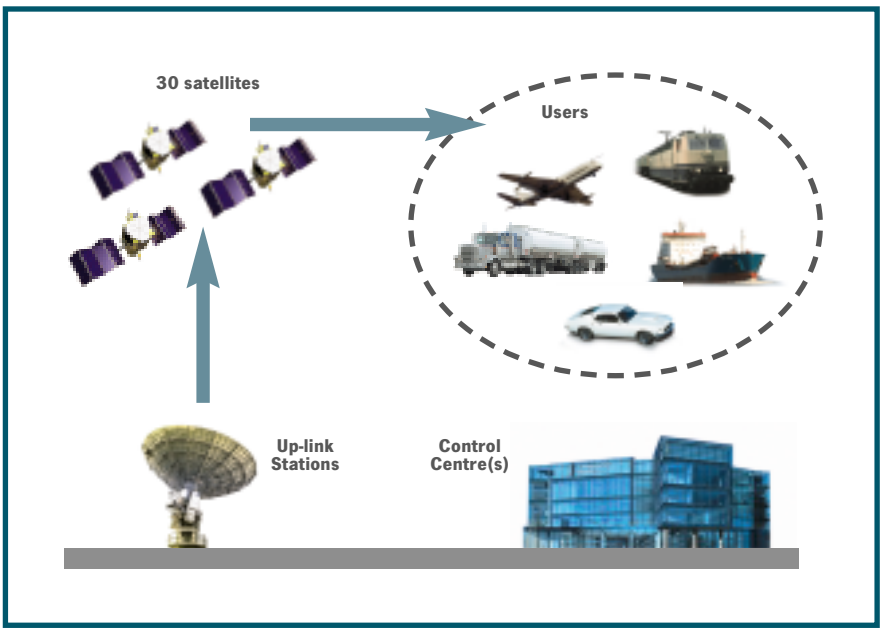


Figure 1: Overview of the Galileo system

Every satellite-based navigation system, including Galileo, consists of three segments:

1. The ground segment
This includes all the ground infrastructure to operate the system, measure and control the satellites positions, and link the different sites that are spread all over the world. Control centres and uplink stations, as shown in figure 1, are also part of this segment.

2. The space segment
This consists just of the satellites. 27 satellites will be used at the same time. Three additional satellites are in space for replacing others if problems occur.

3. The user segment
This is the "visible" part of Galileo with respect to the various users. It consists of stand-alone Galileo receivers or embedded solutions, for example a mobile phone with a Galileo chipset, a PDA, or a car.

Services offered by Galileo

The Galileo system will offer several services, available worldwide:

The Open Service (OS) results from a combination of open signals, free of user charge. It provides position and timing performances competitive with other satellite navigation systems (GNSS).

The Safety of Life Service (SoL) provides, in addition, timely warnings to the user when it fails to meet certain margins of accuracy (integrity). A service guarantee may be provided for this service.

The Commercial Service (CS) provides access to two additional signals, to allow for a higher data rate throughput and to enable users to improve accuracy. A service guarantee will be provided for this service. This service also provides a limited broadcasting capacity for messages to users.

The Public Regulated Service (PRS) provides position and timing to specific users requiring a high continuity of service, with controlled access like police, firefighters, or civil protection.

The Search and Rescue Service (SAR) broadcasts globally the alert messages received from distress emitting beacons. It will contribute to enhancing the performance of the international COSPAS-SARSAT search and rescue system.

The schedule

The Galileo project is already on its way; the budget of about 3.6 billion euro is agreed and financed by the European Space Agency (ESA), the European Commission, and the private sector.

The first four satellites for proof of concept will be launched in 2005. The system will be deployed and be ready to use in 2008. It will complement other systems, like GPS or GLONASS, resulting in a joint worldwide system with higher accuracy and availability. Due to the chosen orbit, Galileo satellites are visible higher above the ground compared to other satellites (figure 2). This offers a better visibility in "urban canyons", caused by the surrounding buildings.

Conclusion

The overall importance of Galileo and its influence on new location based services in Europe can at present only be outlined. A European satellite navigation system is an enabler for industries like tourism, logistics, leisure, traffic optimisation, and many other areas.

By linking location and accurate time information with other, situation and context related data, a world of new services and applications will emerge. Telcos are in a central position to offer attractive new services to their customers and benefit in different roles like service provider, access network operator, or as authentication and billing services provider.

In 2004, Eurescom conducted a study titled "New market opportunities by Galileo satellite services (NEMOGS)", which particularly looked at potential Galileo service areas and business opportunities for telcos. The study results are accessible to the subscribers of the Eurescom Study Programme at ***www.eurescom.de/public/projects/P1400-series/p1442/***

For more information on Galileo, particularly a comprehensive list of potential application areas for Galileo, see ***http://europa.eu.int/comm/dgs/energy_transport/galileo/applications/index_en.htm***

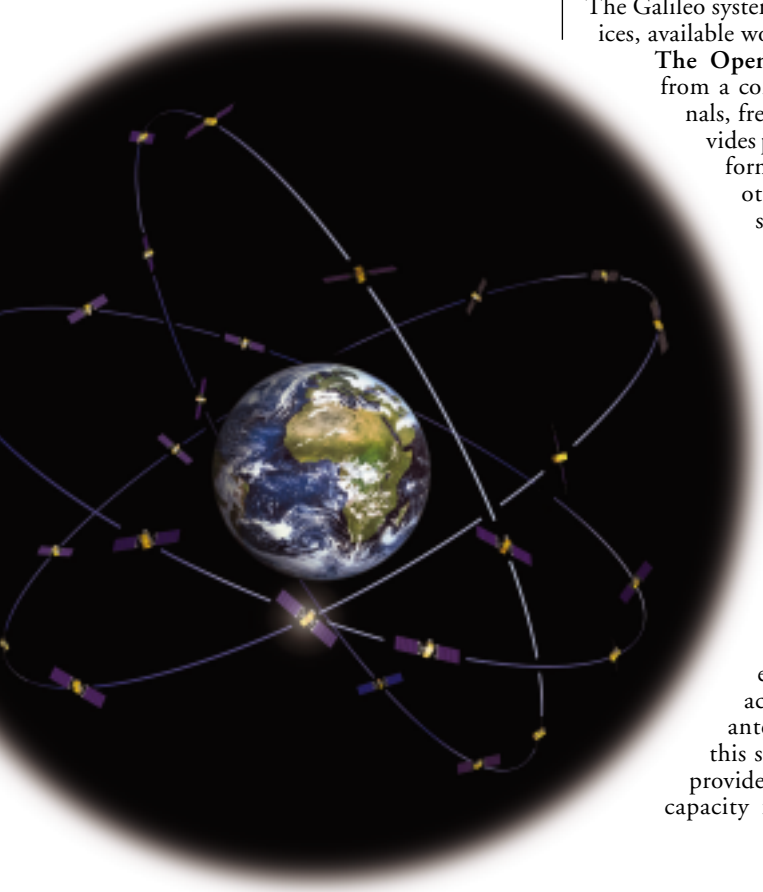


Figure 2: Galileo orbit configuration

Innovation, creativity, and inclusion

Interview with Viviane Reding about her visions and goals as EU Commissioner for Information Society and Media

In November 2004, Viviane Reding took office as EU Commissioner for Information Society and Media in the cabinet of Commission President José Manuel Barroso. The Christian Democrat from Luxembourg was already a member of the Prodi Commission, responsible for education, culture, youth, media, and sport. Before she started her political career in 1979, Ms Reding received a Ph.D. in human sciences from the Sorbonne in Paris and worked as a journalist. In an exclusive interview with *Eurescom mess@ge* she reveals her visions and goals for the ICT sector.

What are your main goals as Commissioner for Information Society and Media?

My main objective is to be a Commissioner for innovation, creativity and inclusion. Firstly, I would like to promote innovation through information and communication technologies (ICT) to make our European economy more competitive. Secondly, I want to promote a sound economic and creative basis for the creation of European content for all media. Thirdly, I will make sure that we create an information society for all, including also the older generation, people with disabilities and people who are simply not familiar with new technologies. I would like to encourage everyone to see this latter task not as a burdensome obligation, but as a unique social and economic opportunity.

What is you vision for the evolving convergence of ICT and electronic media?

I see that by the end of this decade, the long-awaited technological convergence between media content, communication infrastructure and equipment will finally have taken place. To take account of this, Commission President Barroso has for the first time in the history of the Commission entrusted the responsibility for Information Society and Media to one and the same Commissioner. I am thus the Commissioner for convergence, and I am prepared to draw the regulatory conclusions from technological convergence. In 2010, it will not matter any more to the consumer on which device he or she will listen to music, watch movies or follow the news. I am expecting devices which will combine the characteristics of mobile phones, PCs, TV sets, iPods, PDAs, and many others. They will lead to an increasingly consumer-driven, mobile and individualised usage of content. In the end, it will be chiefly the content that will matter for the consumer, less the technology by which he or she receives the content. Regulators in Europe will have to prepare for this new media environment. We have to make sure that a regulatory framework is in place which supports user control and allows business models to flourish on that basis. This is why I intend to make sure that Europe will adopt a light-touch approach with regard to new services such as Voice over Internet Protocol. I also intend to propose a modernisation of Europe's TV Directive, which dates back to 1989 and is hardly up to speed with the new world of media convergence.

You have stressed the importance of improving the citizens' quality of life through ICT. How do you think this could be achieved?

Just today I have presented here in Brussels at a press conference three projects of ICT research, which were funded by the European Union and which have concrete positive effects on the quality of life for citizens.

The first project – the OVTIVIP project – provides an exciting glimpse of the benefits that IST's longer-term research may bring. An optical prosthesis or artificial eye has the potential to totally transform the lives of people having certain forms of blindness.

The second project, APNEE, demonstrates how ICT can be used to protect our citizens against environmental hazards. Living with the consequences of pollution or natural disasters has been very much in the news recently. The IST research project APNEE has developed an application of technology that could in the medium term help provide an early warning to the people most affected by such events.

The third project shows how the intelligent use of ICT can facilitate access to healthcare services for Europeans abroad. The project Netcards points the way to vital improvements in efficiency that will help people seeking medical treatment when in another European country.
Thus, you have three examples where ICT concretely enhances the quality of life of our citizens.

In your hearing before the European Parliament, you made digital inclusion a priority. What are your plans to increase inclusion and avoid the widening of the digital divide in Europe?

You are absolutely right that inclusion is one of the three priority themes of my term as Information Society Commissioner. This is why I have launched in January a public consultation on how to make the benefits of information and communication technologies available to the widest possible range of citizens, including older people and people with disabilities. This consultation is a first step in my endeavour to remove the technical challenges and difficulties that people with disabilities and others experience when trying to use electronic products or services such as computers, mobile phones, or the Internet. Information and communication technologies can be powerful tools for bringing people together, improving their health and welfare, and making their jobs and social lives richer and more rewarding. But over 90 million EU citizens either cannot reap these benefits in full, or are effectively cut off from them because of age or

disabilities. Making ICT products and services more accessible is thus a social, ethical and political imperative. At the same time, it makes sense economically. About 48 percent of people over 50 years old in Europe today say ICTs do not fully meet their needs, but many of them also say that they would buy new mobile phones, computer and Internet services, if they could use them. There are three areas in which the European Union could promote eAccessibility: public procurement, certification, and the use of legislation; I intend to propose a Commission Communication before the summer to outline the best way forward in these three fields, on the basis of the comments received in the course of the ongoing public consultation.

According to the Kok report on the Lisbon strategy ("Facing the Challenge"), the European effort towards realising the knowledge society have not been sufficient; Europe is still lagging behind the US. What is the European Commission doing to achieve the Lisbon goals and make Europe the leading knowledge economy in the world?

The analysis of the Kok report is right, and there is no room for complacency. I would like just to point to one of our deficiencies about which I am very concerned: We know that ICT is the single most important research and technology field for delivering growth. And yet, in Europe we don't invest in it nearly as much as other major economies. We put 20 percent of our research spending on ICT; the competition spends 30 percent. I thus support very actively the Commission proposal to step up Europe's research spending both at national and at EU level.

In addition, I believe that the next few years will see a major period of growth, based on high-speed fixed and wireless Internet services and the convergence of different electronic media and services, and that we have to give our policies affecting

this development a coherent and flexible framework. I have therefore launched a new initiative called i2010 (European Information Society 2010 – the editor), which intends to build on this opportune wave of technological and economic development. My aim is to make sure that Europe gets the full benefits in terms of prosperity, jobs, and growth. I will do this by promoting a borderless European information space with the aim of establishing an internal market for electronic communications and digital services, by stimulating innovation through investment in research, the development and deployment in ICT and by encouraging the industrial application of ICT, and by making the European Information Society as inclusive and accessible as possible.

The i2010 initiative has been included into the Commission's revised Lisbon agenda for growth and jobs, and I am determined to present a strategic Communication on this in the course of May.

Which innovation in ICT would you personally wish to become reality in order to improve your own quality of life?

As you know, I am not only responsible for media, including audiovisual policy, but a true fan of European films. Both as policy maker and as private individual, I regret very much that very often, high-quality national films do not make it to Europe-wide distribution. My dream is therefore that the Internet and the possibility of online distribution will one day be so attractive and safe to film-makers and consumers alike that it will become a real, commercially viable alternative. An alternative which would also be accessible for a small, so far unknown movie from one of the smaller European countries, such as Luxembourg. Online distribution could thus make Europe's great cultural heritage in film-making available to a Europe-wide audience – for the benefit of European films, but also for my very personal pleasure.

The interview was conducted by Milon Gupta.

ALIPRO – New EU project for aligning mobility-related programmes in the new member states

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At a kick-off meeting in Warsaw, the new EU project ALIPRO was launched on 8 March. The Specific Support Action (SSA) under Framework Programme 6 aims at supporting the alignment of the new member states' national and regional research programmes with European IST research in the area of mobile technologies, applications, and services.

The project will accelerate the creation, improvement, and alignment of mobility-related national and regional activities and programmes in the new member states (NMS) and accession candidate countries (ACC), strengthening their integration on European level. ALIPRO will achieve this goal through benchmarking, vision-building and roadmapping as well as dissemination of the results to the relevant stakeholders in the NMS and ACC.

Another important goal of the project is to gather mobile-technology experts from the NMS and ACC and involve them into the work of eMobility, the Mobile and Wireless Communications and Technology Platform. eMobility was launched in

Brussels on 18 March as an industry-driven initiative in order to concentrate European research resources in the mobile and wireless area.

ALIPRO will be performed by a consortium of 14 organisations from all NMS, the ACCs Romania, Bulgaria and Turkey, and 'old' member state Germany. "This composition will ensure representative benchmarking results and a broad European vision," explained project co-ordinator Mieczysław Muraszkiewicz from the Foundation for Mobile Open Society through wireless Technology (MOST).

In order to assure a significant impact, ALIPRO will disseminate its results to the relevant stakeholders through a web-based information platform, a workshop, and presentations at relevant national events. Contacts to a number of potential users of the project results have already been set up and will be maintained and extended during the project execution. "This will facilitate international research cooperation in NMS and ACC and strengthen the European Research Area," said Uwe Herzog from Eurescom, the European telecoms R&D organisation, which initiated ALIPRO together with MOST.

ALIPRO is politically supported by the governments of Poland and Lithuania and by the Romanian parliament. The project has a duration of one year and is expected to give a major push to aligning and integrating the research programmes in the NMS and ACC into the European Research Area. Thus, the project is also intended to start a process of further improvement of scope and quality of the research programmes in the NMS and ACC.

Further information is available at *www.eurescom.de/alipro*

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Lost property in the backseat

Ever more mobile devices are forgotten in taxis

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It is common belief that hackers and phishers are the most dangerous threat for private data security and company networks. In reality, careless users of mobile devices can be much more harmful. Especially, when they are using public transport, a plane, or a taxi. A global survey of 900 taxi drivers shows that thousands of mobile phones, Pocket PCs and laptops are forgotten in taxis every day.

Among the victims are celebrities like British fashion designer Jemima Khan, who had left her iPod, mobile phone, and purse in a London cab. She was not the only one, according to a survey by the Licensed Taxi Drivers Association and mobile security firm Pointsec.

Forgetful taxi passengers

The survey reveals, 63,135 mobile phones, 5,838 pocket PCs and 4,973 laptops were left in the back of cabs in London during the second half of 2004. Compared to the last survey carried out in 2001, this represents a 71 percent increase in laptops and 350 percent increase in Pocket PCs. Surprisingly, the number of lost mobile phones has risen only by less than two percent during that period.

The international survey was carried out in nine major cities, including Sydney, Helsinki, Oslo, Munich, Paris, Stockholm, Copenhagen, Chicago, and London. Although the general trend was the same, there were striking differences.

Londoners head the charts when it comes to forgetting laptops. More than double the number of laptops were left in London taxis compared with other cities.

The Danes are the front-runners in forgetting their mobile phones. They are seven times more likely to forget their mobile in a taxi than the Germans, Norwegians, and Swedes.

Chicago leads the charts in the category of Pocket PCs. There were 21,460 of them left behind in a six-month period.

Taxis were not the only places where absent-minded users left their mobile devices. In London, for example, the Underground and buses are popular places for the oblivious. In 2004, there were 10,614 mobile phones and 5,718 other electronic devices, including cameras and laptops, left behind. However, according to another Pointsec study, the most notorious place for losing a mobile device is still the taxi with a share of 40 percent, followed by bars, restaurants and nightclubs with 20 percent.

Unprotected PDAs

When it comes to mobile devices, forgetfulness can have severe consequences, both on a personal and on a corporate level. A growing amount of sensitive private and corporate data is stored on mobile devices. The growing storage capacity has contributed to this trend.

A PDA usage survey commissioned by pointsec in 2003 has found that PDA owners commonly download the entire contents of their personal and business lives onto their handheld computers – with many leaving the information unencrypted and without password protection. Sensitive information commonly stored unprotected on PDAs includes corporate information, bank accounts, credit cards, social security numbers, inland revenue information, business and personal names and addresses.

Some of those who had lost their PDA, were truly shocked. One comment was: "I thought I had lost my right arm and when I found it (the PDA – the editor) two days later, all was calm and normal again." Another one said: "I had to warn all my friends that their addresses were on there, especially the single females who lived nearest the bar from where the PDA was stolen."

Apart from the personal inconvenience, there is a growing danger that lost mobile devices open the doors to company networks for criminals. Mobile security policies are, according to Pointsec, still the exception, with more than 70 percent of companies not having such a policy.

Happy end for Ms Khan

Luckily, not all lost devices disappear or fall into the hands of crooks.

Globally, an average of 80 percent of taxi passengers were reunited with their mobile phones and 96 percent with their Pocket PCs and Laptops – with the cab drivers in almost all cases tracking down their owners. However, the case was very different in Australia, with only 46 percent of laid-back passengers bothering to reclaim their mobiles and only 18 percent ever being reunited with their laptops.

Among the lucky people who got their mobile devices back was also Ms Khan. The female taxi driver of Ms Kahn found her belongings. When the cabbie got the call to return the items to Ms Khan's friend, she was delighted to discover the friend was actor Hugh Grant.

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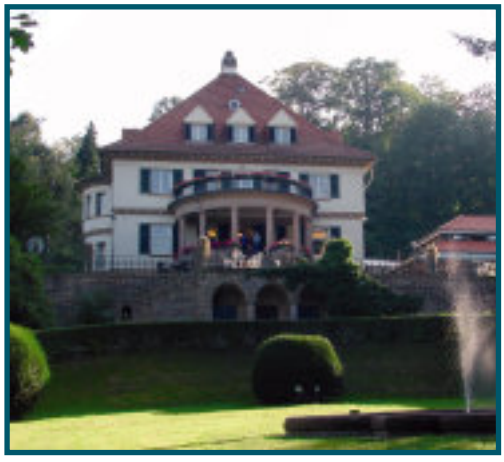

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