Is it magic? - No, it's All About the Consumer

FITCE Congress 2005 in Vienna:

Approximately 350 international experts took part. The industry met under the motto "The Magic Potion to Meet Customers' Desires!" and concerned itself for the first time with the blessings of the modern "information society" from the point of view of the user.

*FITCE President **Carlos Gonzalez Mateos** at the Opening.*

FITCE Europe President Carlos Gonzalez Mateos and FITCE Austria President Alois Miedl welcomed the guests to Vienna. At the opening Mateos announced: "During the next few days we will have the opportunity to review the state of the art in telecommunications."

He praised the advantages of convergence which was rapidly progressing. With the help of high-speed Internet it has become possible to use various media simultaneously. Increasingly better digital networks allow the world of telecommunications and television or the fixed line network and mobile
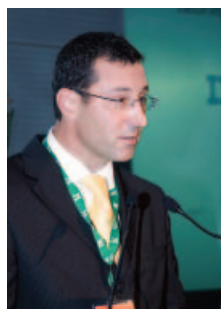
*FITCE Austria President **Alois Miedl** at the Opening.*

communications to grow even closer together.

According to Mateos, the goal of the congress was to design a world without digital barriers and to reconsider the impact of this development on society and our lives.

"Internet Security" Concerns the EU

***Kenneth Ducatel** is in favor of more internet security in the EU.*

Kenneth Ducatel, member of the European Commission, and Wojciech Halka, Polish Under-Secretary of Telecommunications and Postal Services, were guest speakers at the opening ceremony. Both emphasized the necessity of enabling as many citizens as possible – as quickly as possible - to take part in the advantages of the new information and telecommunications technologies. The politicians pointed out that

the general population had to become more aware of the topics security and data protection - on national and EU level - than they had previously. In this regard, Ducatel pointed out the next EU presidency with Austria, in which "Internet security" would be an important topic. A further concern of the EU Commission regarded digital signature. Ducatel: "At the moment we have too many ways of paying by Internet in the EU." He called for uniformity in this area and the introduction of certain standards and control mechanisms.

Poland Slowly Catches Up

Halka described the great efforts that are being undertaken in his country to increase Internet penetration, including digital or interactive television (currently Internet

Wojciech Halka
describes the Polish Telecommunications Agenda.

penetration in Poland is only about 20%). Here Austria is a step ahead: The Austrian State Secretary in the Federal Ministry of Technology, Eduard Mainoni, announced the government's official goal: to provide broadband Internet countrywide in Austria by the year 2007.

All Participants at the Opening Ceremony.

"Go West" for Internet Providers?

Georg Serentschy, Managing Director of the Telecom Regulatory Authority RTR-GmbH, revealed details from the new telecommunications master plan, which will be drawn up by his organization on behalf of the federal government by November 2005. This focuses on the possibility of reaching the end-customer by means of various channels. Bernhard Kerres, Kapsch AG, on the other hand, complained about too much regulation. He compared it with building a railroad in the Wild West: no one there would have thought of making the railroad operators responsible for each piece of coal that was transported from A to B. Why isn't that the same for telcos?

"Internet Driver's License" for Consumers?

Hannes Ametsreiter, mobilkom austria, appealed for the "power of ideas" versus exaggerated belief in technology: in the future, providers should focus more on creative products than on technical feasibility. Harald Himmer, Alcatel Austria AG, and Kurt Neugebauer, Siemens AG Austria, showed concern for the growing digital divide in society and sought solutions for how surfing the Internet and other applications could be learned as easily as driving a car.

High Potential for the E-Society

On Saturday, September 3, 2005, the chairs of all eight meeting sessions arrived at a joint conclusion: the "magic potion" consists of numerous ingredients: infrastructure, services, end-devices, customer demands, customer needs and security. In the future, all of these components will play a role in mobile phone and fixed line services, as well as in wireless broadband services (WLAN, WiMAX, etc.). The classic "Triple Play" comprised of telephone, Internet and television will initially be conducted via a provider that will bundle content but provide

Peter Haas at the Presentation of the Conclusions.

separate services according to each end-device. In the next phase various services will be integrated by several providers simultaneously. This will open the doors widely to the e-society: music, games and special interest offers such as sports, travel or shopping will be able to be consumed anytime within one's own four walls or on the go via mobile phone, television or computer screen.

High Priority for Broadband Expansion

For the providers this means that they must further expand the current broadband penetration in Europe of 32.7 %. There is great demand for broadband services. The question that providers of mobile phone and fixed line have to ask themselves in terms of further expansion is simply: when and with what technologies? The customer is not interested in what kind of network is deployed, but what kinds of services can be received. For this reason, even more than previously, users must be able to use the new

technologies, by means of user-friendly interfaces, etc.

In the future, this will also consist of integrating handicapped or people with special needs into the e-society, e.g. by means of special access solutions such as iDTV for the blind, etc. Ultimately, it must also be the providers' concern to keep the so-called "digital divide" within society as small as possible or to minimize it.

"Multimedia Day": The Providers Grow Together

Friday, September 2, 2005, focused on multimedia and was therefore called "Multimedia Day". In their speeches, three experts from the international telecommunications industry provided interesting food for thought.

Dennis Gonier, Senior Vice President at America Online, spoke on "It's not Magic – It's Advocacy" about customer retention, employee motivation and new incentive models, e.g. in combination with sports sponsoring (football, in the case of AOL). According

Dennis Gonier, *AOL, sees himself as "advocate" for his clients.*

to Gonier, successful business strategy in the area of Internet comprises three components: brand image, price and service. He said: "In a complex and converging world consumers are looking for help." Today, leading brands such as AOL see themselves as advocates for their customers. They listen to their needs and accompany them through an increasingly complex digital world. "Taking care of the consumer" is a primary focus at AOL. Gonier stressed this at the press conference in Vienna prior to the congress.

Alberto Sigismondi, *Mediaset, underlines the importance of interactive TV.*

Alberto Sigismondi, Head of Content Management/ Research & Development in the digital-terrestrial area, Mediaset, Italy, gave examples for interactive advertising in digital antenna television with "Innovation in Commercial TV Broadcasting".
Mediaset was Italy's first commercial television broadcaster and in the meantime has become one of Europe's most successful media companies. The three television channels "Canale 5", "Italia 1" and

"Retequattro" are almost completely financed through advertising. At the press conference, Sigismondi underlined the importance of interactive TV: "Interactivity enriches classical, 'linear' television if the interactivity level is adapted to the respective audience."

Armin Sumesgutner, Head of Strategic and Innovation Management at Telekom Austria, concentrated on multimedia strategies, convergence and new forms of cooperation and communication such as local television, on the example of Engerwitzdorf.

Armin Sumesgutner, *Telekom Austria, introduces an interesting pilot project.*

Award Winners 2005

"Best Presenter": *Franx Wouter, Lucent Technologies, the Netherlands. He spoke about "Combining Enterprise VoIP with 2G/3G Mobility", and illustrated the low-cost combination of VoIP solutions and mobile networks for corporate customers.*

Franx Wouter *receives the award.*

Nico Baken *receives the award by proxy. (Paper Award)*

"Best Written Paper": *Nico Baken, Bas Hendrix, Frank den Hartog and Harrie van de Vlag, the Netherlands. This paper was entitled "In-Home Video Distribution for Telecom Operators". They describe the various alternatives of in-home video distribution, which will be possible by 2010. These include mobile and the so-called "no-new-wires" architectures, as well as unconventional approaches based on analog distribution.*

An active FITCE member was also one of those distinguished: **"Best Young Presenter":** *Edwin Ronacher from Kapsch for his paper "Broadband Wireless Access – An Operator's Opportunity or Threat". This deals with affordable broadband products that provide consumers with freedom of movement/mobility.*

Edwin Ronacher, *the best young presenter. (Ronacher)*

He forecasted that multimedia offerings combined with countrywide broadband infrastructure will point the way to the information society. Sumesgutner: "The New Generation Media enable totally new communication platforms and television formats; provided that the framework conditions are right for the consumers and the complexity of the system will be adapted to the needs of modern life."

Vienna from its Best Side

The numerous events within the social and partner programs also proved to be a great success.

The first evening the guests were taken to "Martin Sepp", a traditional Viennese "Heuriger" or wine tavern, where Austrians like to spend an evening drinking their excellent local white or red wines and eating typical gastronomic specialties. And all this is served with the proverbial Viennese "Schmäh", a mixture of politeness, humor and slight irony. This event was sponsored by Alcatel Austria and was a pleasant conclusion to the first day.

On the second evening all FITCE members and their partners visited "Old Vienna": Siemens Communications presented a special Viennese evening in the "Albertina Museum", one of Austria's most famous museums. Several exhibitions are shown here throughout the year, each representing important artists or art movements.

The guests were enjoying the beautiful evening at the Albertina.

After the exclusive opening of the exhibition "Portraits of an Age - Photography in Germany and Austria from 1900 to 1938", the participants enjoyed traditional Viennese food and "Schrammelmusik" (typical Viennese music).

The crowning moment was the gala dinner. It was sponsored by Telekom Austria in the "Orangerie", the former royal conservatory of the Schönbrunn Palace. The location provided the participants with the

Several young couples were dancing the Viennese waltz.

atmosphere and ambiance of the era of Empress Maria Theresia, with dinner and dancing at a venue which had set the scene for royal and political events during the era of the Austrian monarchy. Our American guest, Dennis Gonier, truly enjoyed the royal atmosphere at Schönbrunn Palace, which he found very "exotic".

Box: Evaluation of the Congress - "Questionnaire"

67% of the participants rated the congress "very interesting" or "interesting". The social program, the well-chosen date and the efficient "conference networking" received the highest marks. Particularly in comparison with past congresses, the Vienna congress fared well with rates between "good" and "excellent". The congress organization and the marketing prior to the event were also highly praised.

There is always room for improvement at any congress and FITCE is always ready to listen to the views of delegates: Feedback indicates that there is scope for Marketing & Technical experts to explain their ideas more simply and clearly to enable understanding across disciplines. Many felt that some parts of the congress were "too technical" and there was a desire to bring in topics with more marketing and legal orientation. Some feedback called for greater focus on vision and long-term goals with more time for questions, answers & discussion following the presentations.

The ideas and suggestions will be taken into account in the organization of the next congress in 2006 in Athens.

Next Congress in Athens, 30 Aug – 2 Sept 2006

The next FITCE Congress in 2006 will take place in Athens under the title: "Telecom Wars: the Return of the Profit". The name reflects the program, which deals with further market development and cultivating long-term customers and service relationships on the fast-moving telecom sector.

If you would like to read more details about the FITCE Congress 2005 in Vienna, please take a look at our congress homepage http://congress2005.fitce.at .There you will find a photo gallery, the official press release, the award winners with their entries and much more.

Address from FITCE President Georgios Argyropoulos

Europe's evolution towards a knowledge-based society presents the telecommunication industry with a complicated challenge. The outcome will define Europe's socio-economic status and shape the daily life of the future.
FITCE plan to respond to this challenge by keeping up with technology, identifying

trends, threats and opportunities for the industry and sharing this information with EU bodies, National Associations, operators and manufacturers. FITCE will work along their mission taking into consideration not only the technical and financial aspects of telecommunications, but also the broader social and environmental European policies,

such as the bridging of the digital divide. FITCE's members are invited to co-operate within and beyond their professional boundaries in order to provide all interested parties with up-to-date expert knowledge, while maintaining FITCE's usual standards of responsibility, fairness and technical excellence.

There is a need for a broadband strategy by public authorities

Filip Geerts
Secretary-General FITCE

ICT should be recognised as the enabling infrastructure of the knowledge economy and not just another sector of the economy. Most economic and social activity in the 21st century depends on advanced broadband communications. Next generation fixed and mobile broadband networks plays a beneficial role for European citizens, small and large companies and Member State governments and public agencies. New ICT networks are crucial for public services and research activities, creates more flexibility for workers, in particular disabled people and people living in rural or remote areas, and speeds up the creation of new small companies and knowledge jobs in remote areas.
The support for broadband infrastructure should be complemented by equally important actions for broadband content and services, especially public sector content and services e.g. to allow regional authorities to develop needed content and services for ePublic services, such as eGovernment, eLearning and eHealth, which will be a key factor in strengthening economic and social cohesion and bridging distance.
European governments are complacent in promoting this important economic necessity and have not given political vision and leadership needed to drive broadband take-up. The European Commission must adopt an umbrella strategy to boost the importance of ICT in terms of innovation/industrial R&D, broadband access, development and take-up, and implement these at Member State and regional levels.
There is a need for public action by Member

State and regional authorities relating to ensuring broadband access, especially in remote and rural communities, and urging local authorities to ensure EU funds be available for industrial Research and Development. In particular, EU structural funds will be vital in bridging the ICT gap between rural and non-rural areas, one of the key factors for increased growth and employment in the Commission's Lisbon strategy.
It is desirable that broadband will reach all areas through competitive forces. However, if market forces fail to deploy advanced, secure and sustainable network solutions to remote and rural communities, governments should be allowed to intervene. Athough it is important to ensure this intervention does not distort competition or inhibit private incentives to invest. Public intervention should be forward-looking and ambitious to the extent that next-generation broadband services and applications can also be offered in remote and isolated areas.
Member States should renew their national broadband strategies including ambitious national targets, both in terms of coverage and take up, but also minimum speed requirements. National broadband plans should also move beyond today's first generation broadband networks and consider next generation networks with improved speed and reliability and the ways to achieve it. This does not mean that the national governments should build the networks themselves. The main role of national or local government is to create an adequate policy

and regulatory framework that would allow private financing of broadband networks, and only take some necessary initiatives if the commercial actors on the market do not see the business-case as attractive enough for a commercial build-out.
When designing which policy measures to use it is in general important not to prescribe which technology should be applied. There is presently a broad palette to choose from, fixed, mobile, wireless and satellite. Those that build the network and take the commercial risks should make the choice, with only the restriction from government side that the quality of service should meet certain standards.
Governments should develop public procurement policies that promote interoperability, in particular by purchasing solutions compliant with open standards developed and supported by industry and thereby ensuring that government installations contribute to interoperability. Public administrations should aim to operate highly flexible, vendor independent, interoperable ICT architectures, which are responsive, open to new technological developments and value-driven.
Public authorities should maintain technological neutrality and provide incentives to continue to innovate. Any procurement decisions should be made on solid business rationale such as degree of interoperability, cost, functionality, security, innovation, support for open standards and adaptability to future technologies.

OFCOM Leads the way – Will others follow?

Ofcom's Strategic Review of Telecommunications in the UK has come up with a wholly new approach to regulating BT, based on a principle called "equivalence" or more specifically "input equivalence". What are the implications for the rest of Europe ? Will the UK become a model to follow, a beacon of competitive light on a dark monopolistic continent, or is it going down a blind alley ? Will the UK be out of step with Europe – or is it Europe that's out of step with the UK ?

Where is the UK going ?

The concept of "input equivalence" is designed to address the "access bottleneck" problem - BT's effective monopoly of the local loop. With the threat of a break-up hanging over it, BT has agreed a number of "undertakings" with Ofcom. BT has set up a new entity, called "openreach", to run its copper loop business and fulfil the undertaking to sell access products to its competitors on exactly the same terms as it sells to itself, at arms length and transparently. In return, where competition is flourishing, for example in the business market, BT will have fewer regulatory constraints.

The undertakings cover a wide range of issues such as the bonus schemes for executives, Chinese walls, operational systems and pricing. Detailed timescales for new systems and arrangements have been agreed. But in the well-worn phrase of the regulatory community, "the devil is in the detail". Ofcom is still consulting about measures for success, and has just started to produce implementation reports.

Many practical issues remain. Although the "undertakings" will be backed up by the High Court which could award damages against BT if they are broken, no company would want to run its business by going to court all the time. Even if openreach is fair and even-handed, it could still be cumbersome and slow, with the inertia effect favouring BT. And will the culture of openreach really react positively to the challenge, or will it continue "walking backwards slowly" as BT has done for years? At the same time, Ofcom has pushed Local Loop Unbundling, forcing the price down dramatically. The effect of this is a new round of consolidation in the UK market – C&W buying Bulldog and Energis, Telewest and NTL finally coming together, Sky taking on

Easynet. We can soon expect to the industry to be dominated by 3 or 4 main players. Whether this creates a truly competitive market, or simply an oligopoly is as yet unclear, but certainly the pressures on smaller players will increase, potentially reducing customer choice.

What might this mean for the rest of Europe ?

The "New Regulatory Framework" Directive (NRF) of July 2003 is based around the concept of "remedies" to "Significant Market Power". Many countries have yet to implement the NRF fully, but several are ahead of the UK in terms of LLU and broadband take-up and competition. The UK likes to believe that it leads the way in telecoms liberalisation, ever since BT was the first PTT to be privatised and to face

competition. The NRF has leant heavily on earlier developments in the UK, so can we expect to see the "equivalence" concept spread further, with incumbents everywhere being forced to open up their access networks further ?

One major difference will be the relative strengths of Cable TV in the various countries. Ofcom's approach tends to drive down the reurns available on access in order to facilitate competition at LLU level. Cable TV is much stronger and better positioned in countries such as Netherlands and Germany, so direct access competition is more viable. Regulators will have to decide on whether local conditions favour more infrastructure competition or whether service providers are the way to provide customer choice. Incumbents, altnets, regulators and customers will all have plenty to think about !

Huw Williams
Director, NetStrategics
NetStrategics is a specialist telecoms consultancy focussing on supporting clients understand the commercial implications of regulatory changes. Clients have included telcos such as C&W, Telewest, AOL, and Viatel, as well as several major IT suppliers to the industry including Cisco, HP, Oracle and Intel. NetStrategics operates with a wide range of associates, with a core of three specialists:
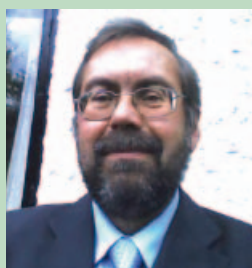
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New Trends in Home Networks

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Introduction

The importance and impact of home networking on our daily life and our comfort at home is increasing very rapidly. The 3 lunch sessions of FITCE Belgium during the season 2004-2005 were devoted to sharing the experience and results of research work dedicated to customer needs for content and facilities in accessing services that improve the home comfort, to revealing some new developments and to the announcement of future appliances, which are based on home networking.

Traditionally, home networks have basically been set up using wired access technologies to share peripherals between several computers (scanners, printers) and to provide Internet access to all connected computers. Next, access to shared files such as photographs, MP3 files, spreadsheets and documents on any computer in the house was warmly welcomed by the members of a family. Youngsters discover very rapidly the facility to play games that allow multiple users at different computers; both with players in the same house and remotely via Internet access. Also multimedia sharing, e.g. to send the output of a device like a DVD player or a Webcam to other computers, has gained interest and impose higher requirements on the home networks regarding bandwidth and abilities to provide low error rates and ensuring low delay package arrivals for streaming audio and video applications. For the wired solutions, the network cables at home ideally should be hidden in the walls. This is rather easy to plan if one is building a new home, but has caused many problems for many customers when aiming to obtain neat results in existing houses without too much havoc. Finally, when moving to another room with some of the equipment installed in the house or even totally to another house, the wired home network is hardly or even not at all reusable.

Low data rate networking has also been set up in the past using the power-line cabling in the house, which does not require extra cables. However, the limited success of such technology in the U.S.A., despite upgraded equipment to offer even 14 Mbit/s, has slowed down penetration in Europe.

Besides the ubiquitous power-lines, with many outlets and wall plugs in the home, also telephone cabling – where available – can be envisaged to set up a wired home network. Nevertheless, in Europe, also this technology has not achieved a stage of great success. Wireless technologies, such as WiFi, when deployed with high security and privacy protection, have many advantages over the wired competitor versions, which make these very attractive for in-house networking. On the one hand, Bluetooth can be used for relatively short distances and is easy to set up and to interface with. The most attractive technology nowadays, however, is to install a hotspot integrated in a DSL-modem, or to interface the Ethernet output of a DSL or television cable modem to a router with WiFi access-point technology.

This article is an abridged version of the full report which can be found at www.fitce.be/lunch_sessions_2004-5.pdf .

Trends in Intelligent Building and Home Cabling

In the first session, Mr Jeffrey Hollands, product specialist of ADC KRONE gave a good overview of both the requirements and the state of the art in Intelligent Buildings and Home Networks.
After defining the concept of Intelligent Building as covering three main goals: building management, space management and business management, Mr Hollands went on to describe the components of an Intelligent Building and its requirements. He then explained some of the downsides like e.g. the increased electrical power consumption per unit area and finally indicated the future directions.
As for the Smart Home, the second part of the exposé, Mr. Hollands clearly indicated that the central concept is 'convergence', the combining of personal computers, telecommunications and television into a user experience that is accessible to everyone in the house. It is about introducing automation, which has so successfully conquered industry, into the home. There is a generally shared view that the home will be intelligent, connected and wireless although the way this will be achieved, and how the home will be networked is still a matter of debate between television-centric and PC-centric factions.

Future home networks – Shape, challenges and (killer) applications

In the second session, Ms. Mary Francia, Senior Director Operator Business Innovation of Philips Consumer Electronics, gave a broad view of the 'Philips Connected Planet' program.
She strongly defended the thesis that "It is not about technology, but it is about the consumer." The 'Philips Connected Planet vision' defines a world where consumers connect and access entertainment, information and services independent of time and location. She explained that the main drivers are threefold:
- Digitalization of multimedia content and products;
- Strong growth in broadband penetration;
- Strong growth in home networking.
The multimedia content stored by users at home is increasing. On average, about half of

wireless network

the European PC owners seem to have more than 100 music files stored on their hard disks, whereas roughly 60% of these PC owners have up to 100 digital pictures on their hard disks and approximately 15% of the latter are using their PCs also to store up to 20 video files at any time.

Ms. Mary Francia based her vision on economic studies which predict that more than 40% of the households in Western Europe and North America will have broadband access by 2008; whereby broadband should be understood as permanent Internet connection using xDSL, cable modem or WLAN. Surveys regarding the question "why do people subscribe to broadband Internet service" show that an increasing number of consumers are using the latter also for entertainment purposes. Finally, she expressed the Philips company vision that future home networks will continue to shift to wireless access technologies, which link traditional audio and video devices to the PC and to the Internet, as is shown in the figure.

Social impact of the new home network technologies

In the third and last session, Professor Dr. Jo Pierson of the VUB and two of his doctoral researchers, M.A. Wendy Van den Broeck and M.A. Richard Tee (VUB, SMIT: Studies on Media, Information and Telecommunication, IBBT and TNO) gave some insight into the kind of research performed at the VUB and various other academic institutions around the world in the area of 'societal and economic implications of ICT'. Jo Pierson and Wendy Van den Broeck (VUB-SMIT-IBBT) presented an interesting

lecture on "Domestication: a social science view on IST use and innovation in the home". Within the social sciences the (home) user of media technology has been a subject of research for some time. Different research departments belonging to distinct theoretical disciplines have examined the behaviour of users of Information Society Technologies (communication studies, sociology, information studies, usability studies etc.). First the presentation gave an overview of these different user approaches. Next the presentation focused on a particular school of thought that has generated many fruitful insights in the use and innovation of IST: the domestication approach. In order to illustrate the latter, examples from recent studies on new media devices (like digital television) have been elaborated and were presented by Wendy Van den Broeck.

In her lecture, entitled "Does idtv imply new uses? A Flemish case - study", she illustrated the outcomes of two significant projects focused on the introduction of interactive digital TV in Flanders: E-VRT, with as players the VRT, Belgacom and the Flemish government, a pilot project that was finished in June 2003 and Flanders Interactive, with the participation of Telenet, Interkabel, the VRT, VMMa (Vlaamse Media Maatschappij), VT4 and the Flemish government, which was finalised in December 2004. Finally, Richard Tee (SMIT-TNO) presented his lecture on "Business models for introduction of B@Home". He discussed the goals of the project Business at Home (B@Home), which aims to develop new business models and technical architectures for end-to-end provision of ubiquitous broadband services to the home, supporting people with their needs for infotainment, health care, education and work.

GSM-Railway technology

Ionut Bibac
Quality Account Manager
FITCE France Secretary

GSM-R is the result of over ten years of collaboration between the various European railway companies, the railway communication industry and the different standardization bodies. In order to achieve interoperability across Europe using a single communication platform, the GSM-R standard combines all key functions and past experiences from the 35 analog systems previously used across Europe. GSM-R provides a secure platform for voice and data communication between the operational staff of the railway companies including drivers, dispatchers, shunting team members, train engineers, and station controllers. It delivers advanced features such as group calls, voice broadcast, location based connections, and call pre-emption in case of an emergency, which significantly improves communication, collaboration, and security management across operational staff members.

One of the biggest private radio network operators worldwide are the Railways. They are in the position to update their obsolete analogue systems into a digital radio solution. This new railway radio system based on GSM equipment was standardized by the railways for the railways and is known as GSM-Railways (GSM-R). The adaptation of GSM technology to meet the needs of railways is yielding the same results as GSM, i.e., the economies of scale for infrastructure and end-user equipment resulting in lower costs, speed of deployment – GSM has track record of over 620 mobile networks and now over 35 Railways across the globe have decided to implement GSM-R, and technology evolution and innovation – no stranded investment as there is a constant evolution of voice and data features supported by the network, Standards Based – no proprietary implementation and therefore it is a multi-vendor solution which implies greater flexibility and freedom for Rail operators.
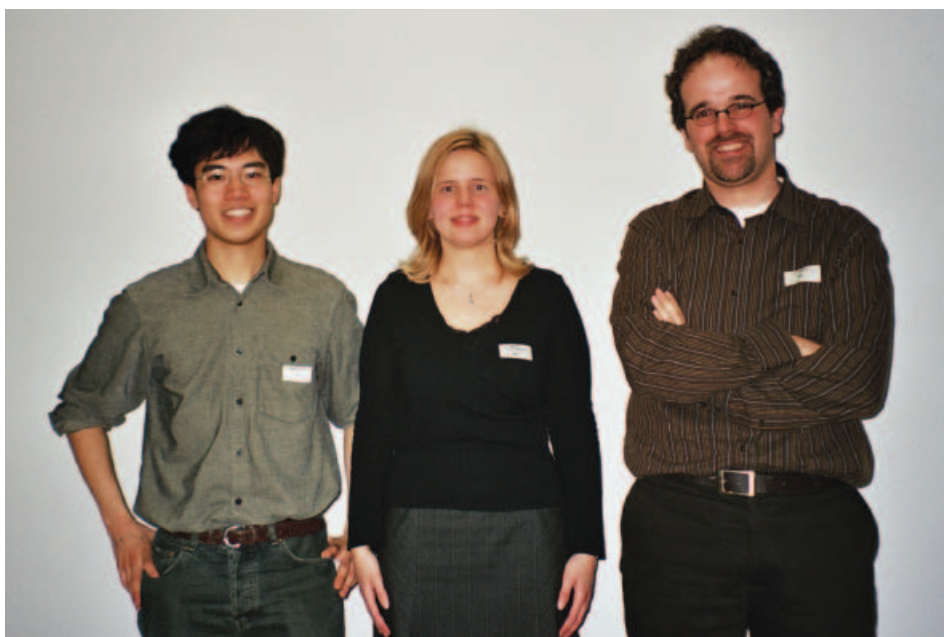
Competition in Broadband access Technologies

By George Agapiou, T. Doukoglou, P. Georgiadis, E. Plakidis, P. Roris OTE S.A. Labs & New Technologies Division

Currently one of the most discussed topics in the telecommunications arena, is the provision of broadband services to business, professionals and residential users. This is due to the fact that today's new applications require more bandwidth for fast downloading the demand for broadband access. Thus a new market for fast internet access has emerged on the user side. On the supply-operator side, there are many different types of broadband access technologies, such as cable, xDSL, powerline, satellite, and wireless. Each of these technologies can compete to provide similar services to consumers and businesses.

For an operator trying to expand its business beyond the traditional voice services, to reach new customer and raise average revenue per user, multi-service access networks are compelling. The multi-service access networks offered by different or by a combination of different technologies are intriguing not only for large operators but for start-up alternative operators, as well.

No single technology has the ability to reach all customers, nor meet the broadband specific requirements.

The **xDSL** technology has been proved to be an important technology that allows an operator to upgrade the classical copper wire network to higher frequency bands for delivering fast data services.

B-PON and GiPON based on pure optical fiber can provide broadband services economically from 100 Mbit/s to Gbit/s. The fiber main attraction is that it can installed without requiring future costs for additional capacity. However, it has a costly requirement when it is laid in the first place.

The **Wireless** technologies, especially the emerging Wimax, seem very attractive since they can provide up to 72 Mbit/s for ranges up to 50 km. This technology is actually a WMAN that provides an alternative to cable, xDSL, xPON, satellite for last mile broadband access. Wireless technologies can be installed quickly and therefore can cut the time it takes to provision fixed-line (copper or fiber) services.

Power Line Broadband provides broadband internet access through ordinary power lines and offers obvious benefits over other cable or DSL connections due to its extensive infrastructure in almost every region.

Satellite is a more expensive technology compared to wired and other wireless technologies to be offered to the residential users. One of the key issues for satellite transmission is the propagation delay, which can range approximately from 250 to 500 ms. This delay can cause problems for real-time applications such as voice.

Considering the above pros and cons of the technologies when a decision comes on which technology to use, there are a number of factors to consider such as: availability, cost, speed, latency, quality, access to the internet, etc.

The predicted market share of the different access technologies is shown below:
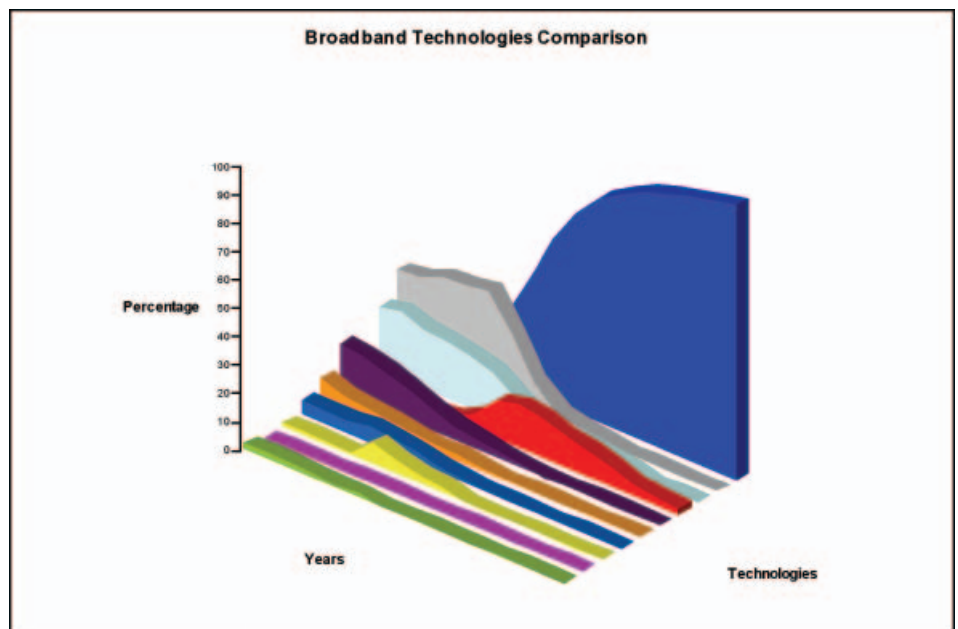
G. Agapiou

T. Doukoglou

P. Rorris

E. Plakidis

P. Georgiadis

Integrated Management of heterogeneous networks: Approaches and Issues

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Introduction

The convergence of data and voice networks as well as the advent of new networking technologies like Wavelength Division Multiplexing (WDM) or Optical Ethernet has created an extremely complex networking environment in terms of layers' inter-working, signalling protocols, management functionalities, OAM (Operation, Administration and Maintenance) flows, etc. To make things worse, this heterogeneity seems to shed across all the hierarchy of the network (access, metro and core) since the technological boundaries between the different parts are turning more and more blurry compared to the past, where specific networking technologies were used in each part. At the same time, the dominance of IP technology as the unified layer for services and applications urges the integration of different networking technologies like WDM, SDH, etc with the IP layer.

In the perspective of these developments, Network Management Systems (NMS) come into the limelight. Service provisioning and network configuration, fault identification and resolution and quality of service assurance cannot be executed in an acceptable time frame without the support of efficient, integrated network management systems capable of managing different networking technologies. Towards that goal, network and service operators face major

challenges when it comes to the management of such heterogeneous networks. These challenges take in the various technology-specific element managers in existence, the diverse domain topologies and hierarchies, the different administrative authorities that run the networks, etc. The integration medium shall address the problems above and provide the network operator with a global way of access into the network, acting as glue that abstracts and homogenizes the technological infrastructure.

Integration Approaches
For the integration of heterogeneous networks there are mainly three different approaches:
- Integration through the data plane: This was the initial approach, which mainly solved the inter-working issues when complex protocol stacks had to be created. Starting from complex protocol stacks like IP/ATM/SDH/WDM, soon we reach simplified and optimised approaches like IP/WDM.
- Integration through the management plane: This approach is the next logical step towards integration of heterogeneous networks. Since, the major inter-working issues have been resolved, network operators have to tackle with the issue of using a single management system for providing their services to its customer. This approach has been driven by the Telco world since for connection-oriented

networks the management plane is more mature.
- Integration through the control plane: This approach was driven by the Internet world due to the matureness of the signalling protocols of connection-less networks.

It should be mentioned that there are also additional integrating approaches which cannot be clearly classified in one of the three previous mentioned approaches. One of these, which is the most promising, is the integration through the cooperation between the management and control plane (hybrid approach). In the rest of the paper, we will analyse the integration through the management and control plane severally, focusing particular on the efforts aiming at the integration through the management plane.

Integration through the Management Plane
Management of Connection-oriented Networks

The term network and service management encompass all the functions and procedures that are required for the configuration of the network, the smooth operation of it, the analysis and resolution of possible faults, as well as the monitoring of the provided services with respect to the agreed Quality of Service (QoS). Traditionally, the network and service management systems were provided

by the network equipment vendor and were appropriately customised according to the needs of each network operator. Those systems were based on the TMN architecture (ITU-T M.3010) and inter-working between different vendors' NMSs was not capable since the majority of those systems were based on close architectures and proprietary interfaces. If inter-working between different vendors equipment was needed then costly solution were developed usually at the NML, allowing the communication with different EMS. Even, in cases where a standardise interface were used, again the usage of proprietary Management Information Bases (MIBs) and the reluctance of vendors to provide their MIBs to third parties to develop gateway between to management systems

were the main burdens for the inter-working of those system. The fierce competition of network operators to gain a significant market share forced them to deployed different networking technologies (i.e. SDH, ATM, WDM) both in the core and the metro of their networks in order to satisfy their customers' needs. Fast response times to customer demands could not have been achieved without the integration of the different management systems. Therefore, there was a need for open architectures and well-defined standard interfaces that allow the integration of different NMS, each of them devoted to the management of a specific networking technology.

Management of Connection-less Networks

On the other hand, the Internet community chose a different approach for the management of the IP networking technology. Due to the nature and the design concept of the first TCP/IP networks, more emphasis was given to the control plane functionality, which allows the automatic re-configuration of the network in case of network failures. Management was used mainly for monitoring purposes and the configuration of the equipment is done manually. The latter is also related to the fact that the IP technology is connection-less and therefore there is no need to configure and provision the network infrastructure for every new service.

Table 1: Overview of Management features

	Legacy Connection-less Networks	Legacy Connection-oriented Networks	Next Generation Converged Networks (IP, ATM, SDH, WDM)
Management Exchange Protocol	SNMP	CMIP	CORBA, IDL, SOAP
Management Entities Format/Model	Tabular object	Managed Object Classes	IDL, XML
Main Management Functionality	Basic Network Provisioning functionality, Alarm reporting (traps), Performance Monitoring	Advanced Network Provisioning functionality, Alarm Reporting (notifications), Fault localisation and recovery, Performance Monitoring	Basic Integrated Network Provisioning Functionality. Alarm Reporting. Fault localisation and recovery, Performance Monitoring
Logical Layers Architecture	Network Element Layer (NEL)	Network Element Layer (NEL), Network Management Layer (NML)	Network Element Layer (NEL), Network Management Layer (NML), Service Management Layer (SML)
Operation Complexity	Medium	High	Medium
Implementation Complexity	Low	High	Medium
Integration	Not needed, since everything is IP based	Partially supported, only for the same vendor products portfolio	Supported through well published open interfaces

The management of the IP network elements is based on the Simple Network Management Protocol (SNMP) protocol, which is the de-facto network-management protocol in the Internet community. Only recently, with the advent of the MPLS framework, IP resemble the connection oriented approach and different research projects, international fora, as well as standardisation bodies are working towards the definition of a carrier-class management framework for the IP/MPLS.

Management of Next Generation Converged Networks

Based on the experience gained from the management of connection-oriented networks and connection-less, together with advances in distributing computing environment (i.e CORBA), management data description (i.e. XML) as well as management data exchange protocols (i.e. SOAP, CORBA IDL), different international fora and standardisation bodies are working towards the goal of managing in an integrating way the heterogeneous Next Generation Converged Networks. Among this work, we should mention the work done by Tele Management Forum (TMF), which has launched a series of programs to capture the needs of network operators and service providers to enable the "technology integration" and the end-to-end "process automation" of telecommunications and data services operations. The Telecom Operations Map (TOM) is one of the main frameworks for accomplishing the above mission. The TOM defines the business processes and their interactions used by Service Providers in the Customer, Service and Network Management areas. In this context, TMF has adopted and started specifying transport-technology-independent common management interfaces from the EML towards the NML and from the NML towards the SML, sometimes called the "Open CORBA" interfaces. The outcome of the above efforts was a series of documents providing among others the Multi-Technology Network Management (MTNM) Interface and the Connection and Service

Information Model (CaSMIM) specifications. The necessity of an Integrated or Inter-technology-domain NMS (INMS) is pointed out serving as an umbrella on top of multiple single-technology domain management systems, providing southbound interfaces towards the technology-domains and northbound interfaces to the Service Management Systems (SMS).

Integration through the Control Plane MPLAmbdaS/GMPLS

MPLAmbdaS was initially proposed by IETF as a mean to extend the MPLS concept to the optical domain allowing the reusability of existing IP signalling protocols. GMPLS was the generalisation of MPLambdaS covering different networking technologies both connection-oriented and connection-less. The term "GMPLS" is colloquially used to refer to a set of protocols that, when complete, will work together to provide interoperable end-to-end provisioning of IP service over heterogeneous transport networks.
ASON/ASTN
The ASON/ASTN framework specify the functionalities and the interface between the control, management and transport plane in a transport-layer independent way with ultimate goal the provisioning in an automatic and fast way of end-to-end Optical Channel connections via the control plane as the outcome of a request of any client layer called "User" through a User to Network Interface (UNI) interface.
Unlike in the IETF, where the optical control plane standards evolved out of a set of existing protocols, the ITU specified architecture from scratch based mainly on the Telco background. Thus, while GMPLS inherits IP concepts and protocols, ASON/ASTN draws on concepts from protocols used heavily in telecoms transport networks, such as SONET/SDH and ATM. Finally, ASON/ASTN framework is not bounded yet to any particular signalling protocols (i.e. IETF's CR-LDP or RSVP-TE) Both IETF and ITU initiatives suffer from

the same curse: a host of signaling protocols all meant to do the same thing. Every company or organisation fights to strengthen their own proposed technology, resulting in inefficiency in establishing a common control plane platform. Till such issues will be resolved and standardisation of signalling protocols will be a reality, a short-term approach is the usage of the hybrid approach (cooperation of the management and control plane) in order to achieve the integrated management of heterogeneous networks.

Conclusions

Network Management is going to be an essential foundation on which practically all future network automation efforts are likely to rest. Multiple management functions will be tightly integrated, forcing networks to become more user-centric, while harnessing operational and capital cost.
To meet growing business demands, integrated network management shall encompass the implementation of policies in its paradigm. Policy-based management is the solution that will allow organisations to prioritise networking resources such as bandwidth, application access and security clearance based on individual users. These policy-based management tools will have to be self deploying, self configuring and self healing, automatically discovering any changes taking place in the network infrastructure and dynamically building and altering policies for accessing resources based on needs.

Dimitris Chronis

Giorgos Hatzilias

I. Raptis

IST OLYMPIC project *(Project reference: IST-2000-30046):* Design, deployment and evaluation of a large scale platform for streaming live and prerecorded content over the Internet.

Authors: [Michael Argyropoulos, Charalambos Patrikakis (NTUA)], [George Tranoudis, Costantinos Boukouvalas (OTE)], [Mario Serafim Nunes (INOV)]
PARTNERS involved: Atos Origin sae, Siemens Mobile Communications SpA, National Technical University of Athens (NTUA), Hellenic Telecommunications Organization S.A. (OTE), Thales Broadcast and Multimedia, INESC Inovacao (INOV), Telecom Italia, OTENET S.A., Hellenic Broadcasting Corporation (ERT)

1. Introduction

Recent advances in internet and streaming media made feasible the live coverage of events over the internet. Such coverage, though it may still lack in terms of image quality compared to that of traditional television, it is superior in terms of functionality and cost. Therefore, the internet may be used in parallel to television as a supplementary media that can benefit from the use of existing infrastructure for live coverage of major cultural and sport events, such as the World Cup Soccer and the Olympic Games. In order to do this however, deployment of a platform that can cover the needs of many and diverse user equipment, software and access networks is a prerequisite. Furthermore, this platform should be able to overcome the problems of interconnection and interoperation between different providers that should cooperate in order to support global event coverage. These are the initiatives behind the IST OLYMPIC project.

The main objectives of the IST-OLYMPIC project are to define, implement and integrate novel end-to-end large scale network solutions and multimedia coding techniques, towards the realization of a decentralized system able to efficiently capture, encode and distribute hundreds of personalized audio and video streams from live sources across the Web to multiple recipients. In the conceptual definition of the OLYMPIC system, one may identify four basic elements. The basic objective is to bring the content to the client, which is in fact one of the basic elements. Following, the Video Capture Storage and Streaming element is where the video content is generated and, in some cases, stored. The Web Server is the entry point to the client, who can use different devices to access the content, which is enriched with some related information. Finally, the Video Distribution is in charge of bringing the content to the client that has requested it.

2. Platform Architecture

The end-to-end platform is comprised of the following areas:

1. The **Encoding/Contribution** Network, where the content is prepared. Live content is captured and encoded into the appropriate media format and is fed to the media streaming servers at the next level. Along with the live content generated by the encoders, prerecorded content may be used, while the platform provides for different encoding standards that match the requirements of diverse equipment and access networks.

2. The **Distribution Network,** in which the encoded content is fed to the media servers. The media servers are capable of streaming content using industry-standard protocols (RTP/RTCP/RTSP 5, [1]). The content is further propagated to end-users through the Streaming Access Server (SAS), a modular relay node used for the formation and maintenance of an overlay delivery network. For supporting targets of different capabilities, the SAS can couple with a Transcoder for providing multiple versions of the same content in various bitrates.

3. The **Access and Content Playback Network** in where the users' terminals are situated. The platform targets a variety of audience equipped with different types of terminals (both wired and wireless) and supports heterogeneous access technologies (e.g. ADSL, Ethernet, WLAN, PSTN, ISDN, GPRS, UMTS, etc). Access to the media is enabled through the use of commercial applications, without need for any modifications.

4. The **Broadcasting Center** which is based on three major components: the Content Manager responsible for administrating the available content to be streamed, the Network Distribution Manager (NDM) responsible for the administration of the Distribution Network and the Front-end subsystem (based on web access) for providing access point to the users for retrieving information about the available content.

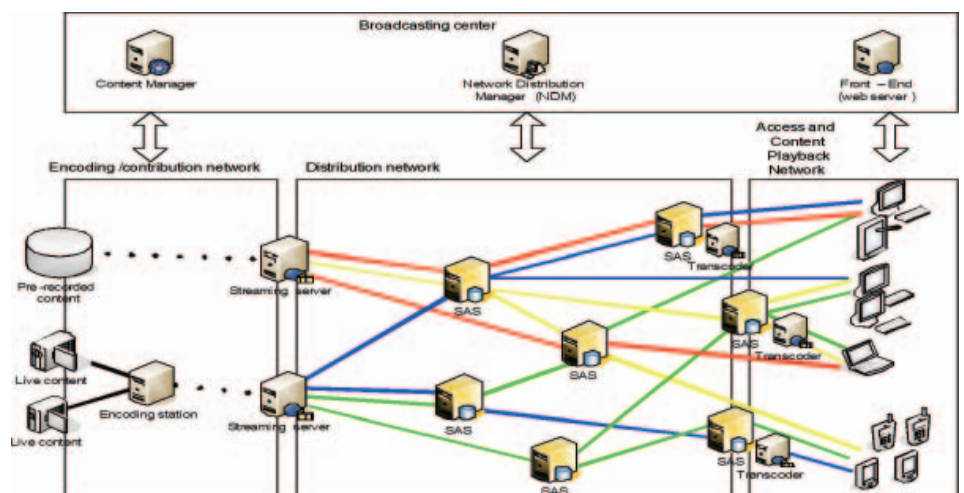The aforementioned architecture and components are depicted in **Figure 1.**

Figure 1 - Overall Architecture

3. Platform Deployment

In order to test the platform under real conditions, the OLYMPIC project incorporated trials and demos that included actual users, over existing broadband infrastructures. Furthermore, taking advantage of the Athens 2004 Olympic Games, and the fact that major telecommunications and television operators in Greece were participating in the OLYMPIC project, trials during the Olympics and Paralympics games were planned.

In **Figure 2** the trial platform is presented. There are five parts defined by the participating companies' logos and covering the whole distribution chain from content capture down to playback at the end-user terminals. Following the design of the OLYMPIC platform, the trial test bed was specified in a way that could serve clients using multiple modalities and access networks from mobile terminals to standards PCs.
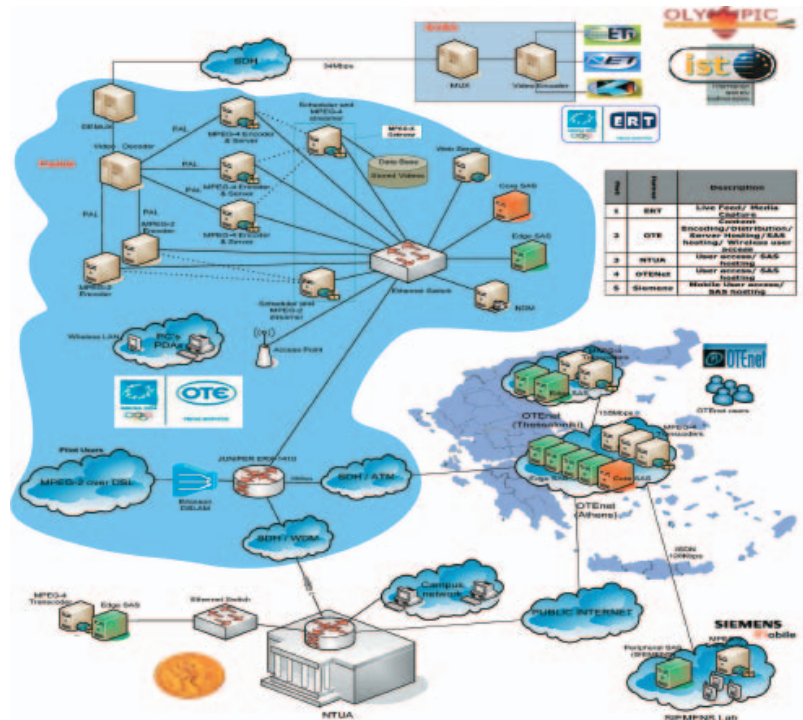
3.1. Media Capture / Live Channel Feed

During the Athens 2004 Olympics and Paralympics Games, ERT, the Greek national broadcaster, and owner of three different TV channels, was providing live content from the stadiums and arenas in and around Athens. The content was aggregated to AOB (Athens Olympic Broadcasting Center) and then delivered to the OTE distribution center in OTE-NYMA. This signal served as the input to the OLYMPIC platform.

3.2. Content Encoding / Configuration

In OTE-NYMA site, the signal of the three ERT channels were multiplexed over ATM (using one VP/VC for each channel) and were carried over an E3 link to the OTE R & D site in Psalidi where they were fed to the MPEG-2 and MPEG-4 Encoding Servers. For MPEG-4, the encoding parameters were QCIF, 12.5 frames per second and a bitrate of 256 Kbps for video. Audio bitrate was 32Kbps. For MPEG-2, video and audio were encoded using an aggregate constant rate of 2 Mbps per stream.

3.3. Media Distribution and User Configuration

The media distribution chain was based on the use of Core and Edge SASs that were connected in the way depicted in **figures 1 and 2.** The starting point of the media distribution trees were the MPEG-4 and MPEG-2 Streaming Servers (both situated in OTE). All partner sites participating in the trials (namely OTE, OTENet, NTUA and Siemens) hosted SASs in order to obtain and provide the streams to their pilot users. OTE used a Core SAS for serving clients inside the OTE network and for providing content to the OTENet and NTUA sites. Users from OTE were accessing the streams

Figure 2 Overall Trial Platform

from their Core SAS. OTE terminals were participating over a 100 Mbps Ethernet LAN or a 54Mbps Wireless LAN. For the more bandwidth-intensive MPEG-2 material, OTE has also provided a pilot access multiplexer (DSLAM) with an STM-1 link at 155 Mbps providing access over DSL broadband links up to 2 Mbps.

OTENet selected as pilot users the ones with DSL access at 384, 512 and 1024 Kbps.

3.4. Athens 2004 Olympics Games Trials Analysis

The platform components log down different statistics that allow us to perform a comprehensive analysis of the platform operation during the trials and determine the use of the platform in terms of number of clients and their behavior. For this evaluation we assumed that each IP address defines a different user and the examination of the logs showed that 451 distinct IP addresses

accessed the platform, generating 3885 RTSP requests for streams, out of which 99.69% were successfully served. It has to be noted that a 0.8% of the IPs generated the 23% of the total requests, leading us to the conclusion that these requests were from clients behind NAT. In the following results, this data is also included, unless stated otherwise.

The profile of the users in terms of their location and bandwidth connection can be extracted from the information provided in Figure. Also pilot users from OTEnet had mainly ADSL access. ADSL users with 512 Kbps or 1024 Kbps connections were accessing the 256 kbps streams, while users with 384 Kbps connection where accessing streams deriving from transcoding of the initial 256kbps streams to a lower 128 kbps rate. Since NTUA users were using LAN connections, they were also accessing the 256 kbps streams.
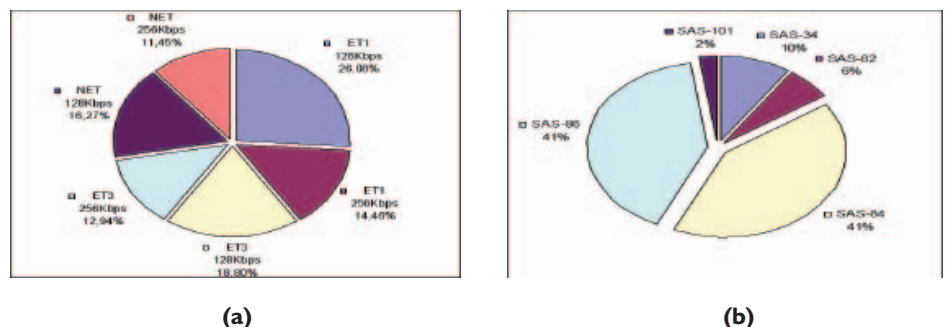

(a)

(b)

Figure 3 Client behavior and apparent profile (a) Stream popularity according to the amount of user requests (b) Percentage of IPs on each SAS

3.5. Athens 2004 Paralympics Games Trials Analysis

During the Athens 2004 Paralympics Games, another evaluation pilot trial of the platform was carried out. These trials were performed for shorter time interval during the day, but expanded over a three day period, from 22nd to the 24th of September 2004.

Here we evaluated the ability of the platform to record content and stream prerecorded content either created using the platform tools or from external sources, such as video tapes. There is no difference in the way the platform was used regarding the prerecorded content when compared to that of the live, since the platform uses nVOD mechanism for prerecorded content streaming. The architecture used for media distribution was the same as in the Olympic games trials. As for the prerecorded content, this consisted of the opening ceremony (in two versions broadcast in parallel: one with commentary and one with the stadium natural sound), the closing ceremony, a selection of events from the Sydney 2000 Paralympics games and prerecorded material from the previous days of the Paralympics trials. During the day, the live coverage of the events was broadcasted as live material to the users, while in parallel was recorded in order to be used in the next day of the trials as an extra prerecorded stream.

Client requests to individual streams show the popularity of each stream during the trials. The results in Figure show that all streams got merely the same attention by the users,
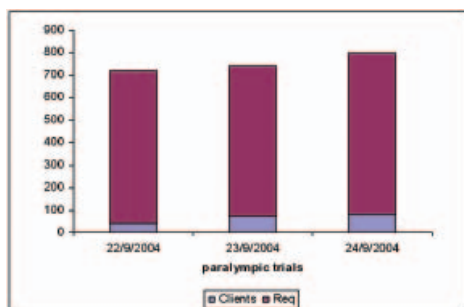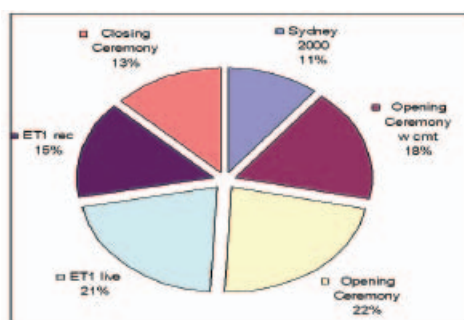

Figure 4 Number of clients & requests

Figure 5 Stream popularity

and combining that information with the results in Figure one may see that the users have a "zapping" behavior as they generate many requests to all content.

It has to be noted that streams of 36 Kbps or 64 Kbps where used for rate adaptation, transparently to the user, as well as for input to the GPRS testbed.

In order to demonstrate the processing power and memory consumption during the experiments, we are presenting the measurements for the 22-9-2004 on 2 SASs (one located at the premises of OTENet and one at NTUA). In the above figure, the temporal behavior of the clients, together with the behavior of the SASs in terms of memory and processing power can be found. We see clearly that the amount of memory and processing power required at the SASs is significantly low.

4. Conclusions

Trying to summarize the features and advantages of the platform compared to existing solutions, we should note that:
The presented platform constitutes a scalable and highly flexible system that can incorporate various type of solutions (as long as they comply to the adopted standards).
The platform is able to automatically reconfigure itself in cases where some SAS are disabled. This is done through the inherent ability of the relay nodes (and the clients software) to perform experiments and select the optimal (according to the selected metrics) connection for accessing a media resource.
The platform is also highly modular, since the nodes may be configured to select the best point of connection according to different metrics including, proximity, resource usage and available bandwidth, or a combination of the above. In this, the platform can be configured to operate under different scenarios, which can also be modified during the period of an event coverage.
Coming to the results from the evaluation of the platform through the pilot trials, we can conclude that the results indicate that resource usage was very satisfactory. Looking at the usage of SASs, especially in cases of high interest, we can see that the overlay mechanism deployed for load balancing of users has allowed for near equal utilization of SAS resources. Another result that we may extract from the trials is that the system dimensioning proved good, regarding placement of SAS in the different sites. As for the behavior of users, we saw an equivalent behavior as the one expected from a TV viewer. Users were constantly "zapping" between the different channels, while at the

times where Greek athletes or teams were competing the number of users significantly increased for the stream/channel was covering the events.

As for the main advantages of OLYMPIC platform we would conclude, that this project managed to build a large scale platform which offers the opportunity to be managed and parameterized many times while working. SAS's can easily be removed and maintained while their traffic will be shared to many other SAS's.

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The **45th FITCE Congress**
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Apart from its long history and tradition and its unique monuments, as well as the success of the 2004 Olympic Games, nowadays Athens stands as a modern European city, offering an immense variety of cultural and leisure highlights and magnificent natural beauties to all visitors.

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Information and Communication Technologies are one of the important dynamic forces for growth in modern economies. They contribute to transform economic and social activities, lead to higher labor productivity growth, and foster economic and social cohesion.

The 45th FITCE Congress is planned to focus on the new reality observed in the market(s), where there are strong "confrontations" especially between network operators, service providers and other "players". In fact, although convergence is a principal technological feature leading innovation, there is still a "lack" in the evolution processes which are referred to other parallel domains (such as promoting services' offers, establishing an appropriate underlying regulatory framework, etc.). After the initial mobile explosion, the fixed operators have now reorganized their potential and returned to a mature "battlefield" by offering competitive alternatives, in a way to re-gain their lost "ground". At the same time, next generation networks and new service-applications are key drivers for the economic growth.

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