



PROGRAM GUIDE

# NETWORKS 2008

13<sup>th</sup> International  
Telecommunications Network Strategy  
and Planning Symposium



„Convergence in Progress“

DANUBIUS HEALTH SPA RESORT MARGITSZIGET  
BUDAPEST, HUNGARY

September 28 – October 2, 2008

Organised by



[www.networks2008.org](http://www.networks2008.org)



# NETWORKS 2008

## 13<sup>th</sup> International Telecommunications Network Strategy and Planning Symposium

DANUBIUS HEALTH SPA RESORT MARGITSZIGET  
BUDAPEST, HUNGARY

September 28 – October 2, 2008

### Organized by



Scientific Association for Infocommunications (HTE)



Department of Telecommunications and Media Informatics (TMIT)  
of Budapest University of Technology and Economics (BME)



### Main patron



National Office for Research and Technology

### Gold patron – Gala Dinner



### Silver patron – Program Guide



### Bronze patron – Lunch on September 30, 2008



### Scientific partners



### Technical co-sponsors



# CHAIRMAN'S MESSAGE

## Welcome to Budapest!



It's a great pleasure for me and a great honor and proud for the Hungarian telecommunications community to cordially welcome all the kind participants of the 13<sup>th</sup> International Telecommunications Network Strategy and Planning Symposium, the *Networks 2008* in our capital, Budapest.

*The Networks conferences* have a 28-year history of dealing with the more and more complex

planning issues in telecommunications networks, attracting participants from all over the world: network operators, service providers, manufacturers, software companies, system integrators, researchers from universities and industry, marketing experts and policy-makers, regulators. Networks conferences have moved around the world in its history. Networks was first hosted in Paris in 1980, then at Brighton (UK, 1983), Innisbrook (Florida, USA, 1986), Palma de Mallorca (Spain, 1989), and Kobe (Japan, 1992). It came first to Budapest in 1994, and then traveled to Sydney, Sorrento, Toronto, Munich, Vienna and finally at New Delhi (2006). Networks 2008 is the first occasion that the International Management and Scientific Committee (IMSC) has invited a country to organize the conference for a second time. Over the years, the scope of the conference has broadened from planning and optimization questions of telecommunication networks to strategic and planning issues of infocommunication networks, including all types of converging telecom and computer networks.

The motto of Networks 2008 is "*Convergence in Progress*". Networks 2008 will focus on the challenges of planning networks to deliver on the promise of convergence of the Information and Communication Technologies (ICT) and Next Generation Networks (NGN). The challenges are many: how to build high performance networks for converged services where every step is cost justified and drives profitable growth, where difficult issues of scalability, end-to-end network performance, network management, network and service control, reliability, security and interoperability are planned and then realized, and where flexibility is maintained to allow experimentation with new applications that can foster new

### NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

and compelling revenue streams for operators. Unleashing the synergic value of convergence and the reduction in the number of network platforms requires innovation in network planning methods, scalable architectures, new optimization algorithms, and understanding the tradeoffs between different technology choices and migration paths.

*Networks 2008* keeps the traditional structure of *Plenary Sessions* (4) and parallel *Technical Sessions* (3X7), the conference program involves both invited state-of-the art presentations and scientific lectures, as international experts present their latest findings and share experiences in network strategy, planning, operations, management, control and design. Beyond the scientific sessions *12 tutorial lectures* covering the most modern networking issues are also included in the program. *An exhibition* presenting new software products and tools using recent results and developments in network planning and optimization is also attached at the conference location. *The social events*, as Welcome reception, Get-together party and Gala dinner, are organic parts of the conference program, providing additional opportunities for the exchange of views, deepening friendships and enjoying Hungarian hospitality and some beauties of Budapest.

I would like to express my grateful thanks to all persons having actively participated in the organization of Networks 2008, in particularly IMSC members, TPC, NAB and LOC chairs and members. We are grateful to our patrons for their financial support and to our sponsors for their professional support in the organization. We are equally grateful to all of the authors having prepared good presentations, to the reviewers making possible to choose the best contributions.

Dear Colleagues: participants, speakers, session chairs, organizers, accompanying persons: thanks for your participation, make a good use of the content of the proceedings of all the 13 Networks conferences on a pendrive, and enjoy the Networks 2008 and your stay in Budapest!



Prof. Dr. Gyula Sallai

Department of Telecommunications and Media Informatics  
of Budapest University of Technology and Economics  
(BME-TMIT),

Scientific Association for Infocommunications (HTE),  
Chair, Networks 2008 International Management and  
Scientific Committee

#### NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

# TABLE OF CONTENTS

---

<b>Committees</b>	<b>6</b>
<b>Programme Overview</b>	<b>13</b>
<b>Tutorials</b>	<b>15</b>
<b>Plenary and Technical Sessions</b>	<b>17</b>
<b>General Information</b>	<b>33</b>
Networks 2008 Secretariat and Registration	<b>33</b>
Conference Venue	<b>33</b>
Registration fees	<b>34</b>
Payment	<b>34</b>
Cancellation Policy	<b>35</b>
Proceedings	<b>35</b>
Exhibition	<b>36</b>
Social Programme	<b>36</b>
Official Language	<b>37</b>
Internet Access	<b>37</b>
About Hungary	<b>37</b>
About Budapest	<b>37</b>
Useful information about Hungary	<b>38</b>
<b>Map of Danubius Health Spa Resort Margitsziget</b>	<b>42</b>

# COMMITTEES

---

## International Management and Scientific Committee (IMSC)

*IMSC Chair:* Gyula Sallai, BME-TMIT and HTE, Hungary  
(sallai@tmit.bme.hu)

### *IMSC Members:*

Alberto Ciarniello, Telecom Italia Mobile, Italy

Oscar Gonzalez-Soto, ITU Consultant, Spain

Joachim Gross, Arcor, Germany

Wolfgang Gross, Telekom, Germany

Hideaki Yoshino, NTT, Japan

Akiya Inoue, Chiba Institute of Technology, Japan

Bernard Jarry-Lacombe, France Telecom, Orange, France

Sang-Baeg Kim, Korea Telecom, Korea

Bernard Liau, France Telecom

Hussein T. Mouftah, University of Ottawa, Canada

Lawrence Paratz, Telstra Corporation, Australia

Michal Pióro, Warsaw University of Technology, Poland;  
Lund University, Sweden

Rati C. Thanawala, Alcatel-Lucent, USA

Andy Valdar, University College London, UK

## Technical Program Committee (TPC)

*Chair:* Tibor Cinkler, BME-TMIT, Hungary  
(cinkler@tmit.bme.hu)

### *Best Paper Award Committee Chair and TPC*

*Co-chair:* Oscar Gonzalez-Soto, ITU Consultant, Spain  
(oscar.gonzalez-soto@ties.itu.int)

*Tutorial Chair:* Andrzej Jajszczyk,  
(jajszczyk@kt.agh.edu.pl)

### *Members and Reviewers:*

Imre Abos, Budapest University of Technology and Economics, Hungary

Wael Adi, Technical University of Braunschweig, Germany

Adil Andaloussi, Orange Labs, France

Santiago Andrés, Telefonica I+D, Spain

## NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

Nicola Andriolli, *Scuola Superiore Sant'Anna, Italy*  
Javier Aracil, *Universidad Autonoma de Madrid, Spain*  
Ake Arvidsson, *Ericsson, Sweden*  
Chadi Assi, *Concordia University, Canada*  
Pieter Audenaert, *Ghent University - IBBT, Belgium*  
Siamak Azodomolky, *Athens Information Technology (AIT), Greece*  
Gabiella Barany, *Sulle Magyar Telekom Plc, Hungary*  
Fabio Baroncelli, *CNIT, Italy*  
Sandro Bellini, *Politecnico di Milano, Italy*  
Boldizsár Bencsáth, *Budapest University of Technology and Economics, Hungary*  
Borbála Benkő, *Budapest University of Technology and Economics, Hungary*  
Tibor Berceli, *Budapest University of Technology and Economics, Hungary*  
David Binet, *France Telecom R&D, France*  
Ferenc Boros, *PKI, Magyar Telekom, Hungary*  
Mohamed Boucadair, *France Telecom R&D, France*  
Isabelle Boyer, *Heard Orange Labs, France Telecom, France*  
Wolfgang Bziuk, *Technical University Braunschweig, Germany*  
Albert Cabellos-Aparicio, *Universitat Politecnica de Catalunya, Spain*  
Eusebi Calle, *University of Girona, Spain*  
Franco Callegati, *Universita` di Bologna, Italy*  
Maria Angeles Callejo Rodriguez, *Telefonica I+D, Spain*  
Aldo Campi, *University of Bologna, Italy*  
Davide Careglio, *Universitat Politecnica de Catalunya, Spain*  
Luis Caro, *University of Girona, Spain*  
Ramon Casellas, *Centre Tecnologic de Telecomunicacions de Catalunya, Spain*  
Piero Castoldi, *Scuola Superiore Sant'Anna, Italy*  
Walter Cerroni, *Universita' di Bologna, Italy*  
Gabiella Cincotti, *University of Roma Tre, Italy*  
Tibor Cinkler, *Budapest University of Technology and Economics, Hungary*  
Walter Colitti, *Vrije Universiteit Brussel, Belgium*  
Denis Collange, *Orange Labs, France*  
Jaume Comellas, *UPC, Spain*  
Tibor Csöndes, *Ericsson Hungary, Hungary*  
Márk Csörnyei, *Budapest University of Technology and Economics, Hungary*  
Marc De Leenheer, *Ghent University, Belgium*  
Hermann Dentler, *Alcatel-Lucent, Germany*  
Chris Develder, *Ghent University, Belgium*  
Tien Van Do, *Budapest University of Technology and Economics, Hungary*  
Gábor Enyedi, *Budapest University of Technology and Economics, Hungary*  
Levente Erős, *Budapest University of Technology and Economics, Hungary*  
Peter Fazekas, *Budapest University of Technology and Economics Hungary*  
Gabor Feher, *Budapest University of Technology and Economics, Hungary*  
Giuseppe Ferraris, *Telecom Italia, Italy*

## **NETWORKS 2008**

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

Péter Fodor, *Budapest University of Technology and Economics, Hungary*  
Viktoria Fodor, *KTH, Sweden*  
Martin Franzke, *T-Systems, Germany*  
Gerald Franzl, *Vienna University of Technology, Austria*  
Gabor Jeney, *Budapest University of Technology and Economics, Hungary*  
Maurice Gagnaire, *E.N.S.T., France*  
Ruth Gamero Tinoco, *Telefonica Investigacion y Desarrollo, Spain*  
Csaba Gáspár, *Budapest University of Technology and Economics, Hungary*  
Geza Geleji, *North Carolina State University, USA*  
Hasslinger Gerhardt, *T-Systems, Germany*  
Alessio Giorgetti, *Scuola Superiore Sant'Anna, Italy*  
Oscar Gonzalez de Dios, *Telefonica I+D, Spain*  
Oscar Gonzalez-Soto, *ITU Consultant, Spain*  
Annie Gravey, *GET - ENST Bretagne, France*  
Claus Gruber, *Nokia Siemens Networks, Germany*  
Rupert Gruenzinger, *Alcatel-Lucent, Germany*  
Mesut Guenes, *FU Berlin, Germany*  
Anna Maria Guidotti, *DEIS University of Bologna, Italy*  
András Gulyás, *Budapest University of Technology and Economics, Hungary*  
Sebastian Gunreben, *University of Stuttgart, Germany*  
Lajos Hanzo, *University of Southampton, United Kingdom*  
David Harle, *University of Strathclyde, United Kingdom*  
Franz Hartleb, *T-Systems, Germany*  
Peter Hegyi, *BME-TMIT, Hungary*  
Bjarne Helvik, *Norwegian University of Science and Technology, Norway*  
José Alberto Hernández, *Universidad Autonoma de Madrid, Spain*  
Xavier Hesselbach, *Polytechnic University of Catalonia, Spain*  
Zalan Heszberger, *Budapest University of Technology and Ec., Hungary*  
Attila Gábor, *Hilt Nokia Siemens Networks Magyarország Kft., Hungary*  
Adam Horvath, *University of West Hungary, Hungary*  
Arpad Huszak, *Budapest University of Technology and Economics, Hungary*  
Tadashi Iizuka, *Oki Electric Industry, Japan*  
Sándor Imre, *Technical University of Budapest, Hungary*  
Bodo Jacobs, *T-systems, Germany*  
Monika Jaeger, *T-Systems, Germany*  
Tivadar Jakab, *Budapest University of Technology and Economics, Hungary*  
Javier Jiménez, *TID, Spain*  
Alpár Jüttner, *Ericsson Research, Hungary*  
Takehiro Kawata, *NTT, Japan*  
Peter Kersch, *Budapest University of Technology and Economics, Hungary*  
Sang-Baeg Kim, *KT (Korea Telecom), Korea*  
Olivier Klopfenstein, *France Telecom R&D, France*  
Jochen Koegel, *University of Stuttgart, Germany*  
András Korn, *Budapest University of Technology and Economics, Hungary*  
Ulf Koerner, *Lund University, Sweden*  
Arie M. C. A. Koster, *University of Warwick, United Kingdom*  
Gábor Kovács, *Budapest University of Technology and Economics, Hungary*

## **NETWORKS 2008**

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

Uwe Krallert, *T-Systems, Germany*  
László Kunsági, *Budapest University of Technology and Economics, Hungary*  
Péter Laborczi, *Bay Zoltán Foundation For Applied Research, Hungary*  
Akos Ladanyi, *Budapest University of Technology and Economics, Hungary*  
Zsolt Lakatos, *Budapest University of Technology and Economics, Hungary*  
Janos Levendovszky, *Budapest University of Tecnology and Economics, Hungary*  
Jorge Lopez de Vergara, *Universidad Autonoma de Madrid (UAM), Spain*  
Cristina Lopez-Bravo, *Universidad de Vigo, Spain*  
Csaba Lukovszki, *Budapest University of Technology and Economics, Hungary*  
Guido Maier, *Politecnico di Milano, Italy*  
Richa Malhotra, *Alcatel-Lucent, The Netherlands*  
Markosz Maliosz, *Budapest University of Technology and Economics, Hungary*  
Anna Manolova, *Danish Technical University, Denmark*  
Eva Marin/Tordera, *Technical University of Catalonia, Spain*  
Tamas Marosits, *Budapest University of Technology and Economics, Hungary*  
Adelys Marsden, *Osaka University, Japan*  
Ricardo Martinez, *CTTC, Spain*  
Valerio Martini, *Scuola Superiore Sant'Anna, Italy*  
Miklos Mate, *Budapest University of Technology and Economics, Hungary*  
Laura Mateo-Quero, *Telefonica I+D, Spain*  
Ryutaro Matsumura, *NTT, Japan*  
Rashid Mehmood, *Swansea University, United Kingdom*  
Marco Mellia, *Politecnico di Torino, Italy*  
Mohamed Fouz Menai, *Orange Labs (France Telecom Group), France*  
Attila Mitscenkov, *Budapest University of Technology and Economics, Hungary*  
Istvan Moldovan, *BME-TMIT, Hungary*  
Sándor Molnár, *Budapest University of Technology and Economics, Hungary*  
Annalisa Morea, *Alcatel-Lucent, France*  
Roberto Morro, *Telecom Italia, Italy*  
Hussein Mouftah, *University of Ottawa, Canada*  
Mohammad Moulavi Ferdowsi, *University of Mashhad, Iran*  
Raul Munoz, *CTTC, Spain*  
Xavier Munoz, *Technical University of Catalonia, Spain*  
Anders Mykkeltveit, *Norwegian Univers of Science and Technology, Norway*  
Dritan Nace, *Compiègne University of Technology, France*  
Peter Nagy, *Scientific Association for Infocommunications, Hungary, Hungary*  
Yukio Nakano, *Hitachi Communication Technologies, Ltd., Japan*  
Felicián Németh, *Budapest University of Technology and Economics, Hungary*  
Krisztián Németh, *Budapest University of Technology and Economics, Hungary*  
Ralf Nitsch, *T-Systems, Germany*  
Sara Oueslati, *France Telecom R&D, France*  
Géza Paksy, *Budapest University of Technology and Economics, Hungary*  
Zoltan Pap, *Budapest University of Technology and Economics, Hungary*  
József Pápics, *LANeX Consulting Ltd, Hungary*  
Pablo Pavon-Marino, *Polytechnic University of Cartagena, Spain*  
Jordi Perello, *Universitat Politecnica de Catalunya, Spain*  
Marcell Perényi, *Budapest University of Technology and Economics, Hungary*

## **NETWORKS 2008**

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

Harry Perros, *North Carolina State University, USA*  
Carolina Pinart, *Centre Tecnologic de Telecomunicacions de Catalunya, Spain*  
Michal Pioro, *Warsaw University of Technology, Poland; Lund University, Sweden*  
Bart Puype, *Ghent University, Belgium*  
Franz Rambach, *Nokia Siemens Networks GmbH & Co. KG, Germany*  
Marco Ramilli, *Universita' di Bologna, Italy*  
Francisco Javier Ramon-Salguero, *Telefonica I+D, Spain*  
Gábor Rétvári, *Budapest University of Technology and Economics, Hungary*  
Laurent Reynaud, *Orange Labs, France*  
Stefanie Richter, *T-Systems, Germany*  
Jose Antonio Rodriguez Fernández, *Telefonica Investigacion y Desarrollo, Spain*  
Ricardo Romeral, *University Carlos III of Madrid, Spain*  
George Rouskas, *North Carolina State University, USA*  
Sarah Ruepp, *Technical University of Denmark, Denmark*  
Sebastien Rumley, *Ecole Polytechnique Federale de Lausanne, Switzerland*  
Germán Santos-Boada, *Universitat Politecnica de Catalunya, Spain*  
Herbert Schmid, *T-Systems, Germany*  
Oana Schnitter, *T-Systems, Germany*  
Stefan Schnitter, *T-Systems, Germany*  
Dominic Schupke, *Nokia Siemens Networks, Germany*  
Juan Segovia, *Universitat de Girona, Spain*  
Sidi-Mohammed Senouci, *France Telecom R&D, France*  
Marina Settembre, *Ericsson Lab Italy, Italy*  
Kaoru Sezaki, *University of Tokyo, Japan*  
Boglárka Simon, *Budapest University of Technology and Economics, Hungary*  
Csaba Simon, *Budapest University of Technology and Economics, Hungary*  
Vilmos Simon, *Budapest University of Technology and Economics, Hungary*  
Kata Sipos, *Budapest University of Technology and Economics, Hungary*  
Nina Skorin-Kapov, *University of Zagreb, Croatia*  
Josep Sole, *Pareta UPC, Spain*  
Balázs Sonkoly, *Budapest University of Technology and Economics, Hungary*  
Salvatore Spadaro, *Universitat Politecnica de Catalunya, Spain*  
Dimitri Staessens, *Ghent University - IBBT - IMEC, Belgium*  
Alexandros Stavdas, *University of Peloponnese, Greece*  
Robert Szabo, *Budapest University of Technology and Economics, Hungary*  
Sándor Szabó, *Budapest University of Technology and Economics, Hungary*  
Peter Szegedi, *TERENA, The Netherlands*  
Attila Szentgyörgyi, *Budapest University of Technology and Economics, Hungary*  
János Szigeti, *Budapest University of Technology and Economics, Hungary*  
Gábor Szöcs, *Budapest University of Technology and Economics, Hungary*  
János Tapolcai, *Budapest University of Technology and Economics, Hungary*  
Wouter Tavernier, *Ghent University - IBBT, Belgium*  
Laszlo Toka, *Eurecom, France*  
Tuan Trinh Anh, *Budapest University of Technology and Economics, Hungary*  
Anna Tzanakaki, *AIT, Greece*  
Eszter Udvary, *Budapest University of Technology and Economics, Hungary*

## NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

Luca Valcarengi, *Scuola Superiore Sant'Anna, Italy*  
Andy Valdar *UCL (University College London), United Kingdom*  
Javier Valero, *Telefonica I+D, Spain*  
Imre Varga, *Siemens Networks, Germany*  
Dorottya Vass, *Budapest University of  
Technology and Economics, Hungary*  
Maria-Angeles Vazquez, *Castro  
Universidad Autonoma de Barcelona, Spain*  
Sofie Verbrugge, *Ghent University - IBBT, Belgium*  
Rolland Vida, *Budapest University of Technology and Economics, Hungary*  
Attila Vidács, *Budapest University of Technology and Economics, Hungary*  
Gábor Vincze, *Budapest University of Technology and Economics, Hungary*  
Zoltán Vincze, *Budapest University of Technology and Economics, Hungary*  
Kyriakos Vlachos, *University of Patras, Greece*  
Ambrus Wagner, *Budapest University of Technology and Economics, Hungary*  
Krzysztof Wajda, *AGH University of Technology, Poland*  
Wilfried Wieser, *T-Systems, Germany*  
Lena Wosinska, *Royal Institute of Technology KTH, Sweden*  
Hisao Yamamoto, *Musashi Institute of Technology, Japan*  
Marcelo Yannuzzi, *Universitat Politecnica de Catalunya, Spain*  
Hideaki Yoshino, *NTT, Japan*  
András Zahemszky, *Budapest University of Technology and Economics, Hungary*  
Hans-Martin Zimmermann, *Munich University of Technology, Germany*  
Szilárd Zsigmond, *Budapest University of Technology and Economics, Hungary*  
Zoltán Zsóka, *Budapest University of Technology and Economics, Hungary*

## **National Advisory Board (NAB)**

**Chair:** László Pap, *BME-HIT and HTE, Hungary*  
(pap@hit.bme.hu)

### **NAB Members:**

Tibor Berceli, *BME-HVT, Hungary*  
Gyula Csopaki, *NKTH, Hungary*  
Ákos Detrekői, *NHIT, Hungary*  
Gábor Éry, *Ericsson, Hungary*  
András Faragó, *University of Texas at Dallas, USA*  
Lajos Hanzó, *University of Southampton, UK*  
László Jereb, *NYME, Hungary*  
Sándor Krupanics, *Kopint-Datorg, Hungary*  
György Lajtha, *HTE, Hungary*  
István Maradi, *Magyar Telekom, HTE, Hungary*  
Christopher Mattheisen, *Magyar Telekom, Hungary*  
László Zombory, *BME-HVT and HTE, Hungary*

## **NETWORKS 2008**

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

## **Local Organizing Committee (LOC)**

**Chair:** Péter Nagy, HTE » Finance  
(nagy.peter@hte.hu)

### **LOC Members:**

István Bartolits, NHH » Press, PR  
bartolits@nhh.hu

Tibor Cinkler, BME-TMIT » TPC-Chair, Publication  
cinkler@tmit.bme.hu

Erzsébet Győri, BME-TMIT » Vice-Chair  
gyori@tmit.bme.hu

Krisztián Huber, Adacta Ltd. » Web  
huber.krisztian@mathifou.hu

Gábor Huszty, Entel Ltd. » Patronage  
ghuszty@entel.hu

Csaba Kántor, HTE » Exhibition  
dr.kantor.csaba@t-online.hu

Csaba Lukovszki, BME-TMIT » Web  
csaba.lukovszki@tmit.bme.hu

Nándor Mátrai, Asszisztencia Ltd. » Hotel, Registration, Payment  
nandor.matrai@asszisztencia.hu

Zsóka Nagy, HTE » Local Arrangement  
info@hte.hu

Vilmos Németh, BME-TMIT, ETIK » Patronage  
vilmos.nemeth@tmit.bme.hu

Mária Tézsla, HTE » Local Arrangement  
mtezsla@hte.hu

Rolland Vida, BME-TMIT » Publicity  
vida@tmit.bme.hu

## PROGRAM OVERVIEW

	<b>Sunday, September 28</b>	<b>Monday, September 29</b>	<b>Tuesday, September 30</b>	<b>Wednesday, October 1</b>	<b>Thursday, October 2</b>
9.00 – 10.30	Tutorials T1, T2, T3	Tutorials T7, T8, T9	Plenary Session P1 Opening	Plenary Session P3	Technical Sessions A6, B6, C6
10.30 – 11.00	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
11.00 – 12.30	Tutorials T1, T2, T3	Tutorials T7, T8, T9	Plenary Session P2	Technical Sessions A3, B3, C3	Technical Sessions A7, B7, C7
12.30 – 14.00	Break (No Lunch)	Break (No Lunch)	Lunch	Lunch	Lunch
14.00 – 15.30	Tutorials T4, T5, T6	Tutorials T10, T11, T12	Technical Sessions A1, B1, C1	Technical Sessions A4, B4, C4	Plenary Session P4 Closing
15.30 – 16.00	Coffee break	Coffee break	Coffee break	Coffee break	
16.00 – 17.30	Tutorials T4, T5, T6	Tutorials T10, T11, T12	Technical Sessions A2, B2, C2	Technical Sessions A5, B5, C5	
18.30 –		Welcome Reception			
19.00 –			Get Together	Gala Dinner	

### NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM



# PROGRAM

---

2008. 09. 28.

Sunday, September 28, 2008

## TUTORIALS

9.00 – 12.30

### STAR ROOM

- T1 From opacity to transparency via translucent optical networks**  
Maurice Gagnaire, *ENST Paris, France*

### MAGNOLIA ROOM

- T2 Efficiency of P2P networks and alternative overlays for content delivery and internet service provisioning**  
G. Hasslinger, *T-Systems*

### YBL ROOM

- T3 IPv6 training**  
János Mohácsi, *NIIF, Hungary*

14.00 – 17.30

### STAR ROOM

- T4 Fiber-to-the-X: Technologies & Economics**  
Mohamed El-Sayed, *Alcatel-Lucent, USA*

### MAGNOLIA ROOM

- T5 Focusing the study on wireless multihop networks**  
Josep Paradells, Carles Gomez, *Technical University of Catalonia, Spain*

### YBL ROOM

- T6 End to end IPTV Design and Implementation – How to avoid pitfalls?**  
Rajiv Chaudhuri, *Ericsson, Sweden*

NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK STRATEGY AND PLANNING SYMPOSIUM

Monday, September 29, 2008

## TUTORIALS

9.00 – 12.30

### STAR ROOM

- T7 Carrier Ethernet Transport in Metro and Core Networks**  
Claus G. Gruber and Achim Autenrieth, *Nokia Siemens Networks*

### MAGNOLIA ROOM

- T8 IP-Oriented QoS in the Next Generation Networks: application to wireless networks**  
Pascal Lorenz, *University of Haute Alsace, France*

### YBL ROOM

- T9 Next Generation Network Techno-Economic Insights**  
Santiago Andrés Azcoitia, *Telefónica I+D, Spain*

14.00 – 17.30

### STAR ROOM

- T10 Changing paradigms from bridged to carrier Ethernet**  
Dimitri Papadimitriou, *Alcatel-Lucent Bell, Belgium*

### MAGNOLIA ROOM

- T11 NGN architectures and their management,**  
Idir Fodil, *FT R&D, France*

### YBL ROOM

- T12 Practical steps in techno-economic evaluation of network deployment planning**  
Sofie Verbrugge, *UGent/IBBT-INTEC, Belgium*

18.30

**Welcome Reception** will take place in the Danubius Grand Hotel Margitsziget.

## NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK STRATEGY AND PLANNING SYMPOSIUM

Tuesday, September 30, 2008

**9.00 – 10.30**

STAR ROOM

**P1**

## **Opening Session**

*Chair: Gyula Sallai, Chair of International Management and Scientific Committee, BME-TMIT and HTE, Hungary*

Welcome

*Gyula Sallai, BME-TMIT, HTE, Hungary*

Opening Words

*Peter Kiss, Minister of Prime Minister's Office, Hungary*

Program Overview

*Tibor Cinkler, Chair of Technical Program Committee, BME-TMIT, Hungary*

Keynote speakers

- *Chris A Fonteijn, Boardmember of the Independent Regulators Group, Chairman of the Commission of OPTA, The Netherlands Independent Post and Telecommunications Authority:*  
**Challenges in ICT regulation**
- *Christopher Mattheisen, Chairman & CEO, Magyar Telekom:*  
**Vision and objectives of Hungarian telecommunications**

**11.00 – 12.30**

STAR ROOM

**P2**

## **Convergence in Progress, Two Perspectives**

*Chair and moderator: Rati Thanawala, Alcatel-Lucent*

Keynote speakers

- *Pierre Tournassaud, Alcatel-Lucent:*  
**Driving Network Transformation: The Trends and Technologies behind IP Transformation of Fixed Mobile Networks**
- *Cayetano Carbajo Martín, Telefonica:*  
**Towards more Intelligent efficient networks**

2008. 09. 30.

**NETWORKS 2008**

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

14:00 – 15:30

STAR ROOM

A1

## Broadband Access: Technology and Economics

Chair: Oscar Gonzalez-Soto, *ITU Consultant, Spain*

- **Access network dimensioning with uncertain traffic forecasts**  
*Olivier Klopfenstein (France Télécom R&D, France)*
- **A New Penalty Based Algorithm For Multi-User Spectrum Balancing in xDSL Networks**  
*Alastair McKinley, Alan Marshall (The Queen's University of Belfast, United Kingdom)*
- **A financial and technological model for public regional broadband infrastructure**  
*Davide Pierattoni (University of Udine, Italy); David Licursi (Mercurio FVG S.p.A., Italy); Pier Luca Montessoro (University of Udine, Italy)*
- **Access Network Sharing between Core Networks with Different QoS Policies**  
*Akihiro Okada (Nippon Telegraph and Telephone Corporation, Japan); Akira Murashige (NTT Network Service Systems Laboratories, Japan); Daisuke Tazawa (NTT Network Service Systems Laboratories, Japan); Shinichiro Chaki (Nippon Telegraph and Telephone Corporation, Japan)*

MAGNOLIA ROOM

B1

## QoS (Quality of Service) Aspects

Chair: Szabolcs Malomsoky, *Ericsson Research, Hungary*

- **QoS as the tool for enabling Broadband commodity within Access Networks**  
*Enrique Areizaga (Robotiker, Spain); Andreas Foglar (Infineon Technologies AG, Germany); Antonio José Elizondo Armengol (Telefónica Investigación y Desarrollo, Spain)*
- **Systematic QoS Class Mapping Framework for Application Requirement over Heterogeneous Networks**  
*Mi-Sun Ryu, Young Min Kim, Hong-Shik Park (Information and Communications University, Korea)*

NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

2008. 09. 30.

- **Cost models for Next Generation Networks with Quality of Service parameters**  
Laura Rodriguez de Lope, Klaus Hackbarth, Alberto García (*University of Cantabria, Spain*); Thomas Plueckebaum, Dragan Ilic (*WIK, Germany*)
- **Service quality improvement based on Network Attachment Subsystem extensions and Service Enhancement Function – Mesh Networks as an example**  
Andreas Roos (*T-Systems, Germany*)

YBL ROOM

## C1

### Availability Issues

*Chair: Csaba Szabó, BME-HIT, Hungary*

- **Novel Conflicting Link Exclusion Algorithms for SRLG-Disjoint Routing**  
Golnaz Vakili (*Amirkabir University of Technology, Iran*); Azadeh Khodaei (*University of Applied Science and Technology, Iran*); Siavash Khorsandi (*Amirkabir University of Technology, Iran*)
- **SRLG-Disjoint Multi-Path Protection: When LP meets ILP**  
László Gyarmati, Tibor Cinkler, Gyula Sallai (*Budapest University of Technology and Economics, Hungary*)
- **Novel Availability Metrics for Network Topologies**  
András Zahemszky, János Tapolcai (*Budapest University of Technology and Economics, Hungary*); András Császár, Attila Mihály (*Ericsson Research, Hungary*)
- **Dedicated Protection Scheme with Availability Guarantee**  
János Tapolcai, Péter Babarczi (*Budapest University of Technology and Economics, Hungary*); Pin-Han Ho (*University of Waterloo, Canada*)
- **Dependability Analysis of Data Center Tier III**  
Montri Wiboonrat (*Assumption University, Thailand*)

2008. 09. 30.

16:00 – 17:30

STAR ROOM

## A2

### Optical Access: Techno-Economic Aspects

*Chair:* Bartolits István, NHH (National Communication Authority), Hungary

- **Optical Broadband Access Networks: A European Perspective**  
George Heliotis, Ioannis Chochliouros (*Hellenic Telecommunications Organization S.A., Greece*)
- **FTTH Network Economics: Key Parameters Impacting Technology Decisions**  
Samrat Kulkarni, Mohamed El-Sayed, Beth Polonsky, Paul Gagen (*Alcatel-Lucent, USA*)
- **Impact of Bandwidth Demand Growth on HFC Networks**  
Pradeep Limaye, Marty Glapa, Mohamed El-Sayed, Paul Gagen (*Alcatel-Lucent, USA*)
- **Broadband demand and the role of new technologies**  
Kjell Stordahl (*Telenor, Norway*)

MAGNOLIA ROOM

## B2

### Scalable Routing & Admission

*Chair:* Sang-Baeg Kim, Korea Telecom, Korea

- **Root Controlled Bridging: a Scalable Control Protocol for Shortest Path Bridging**  
Janos Farkas, Richard Pallos (*Ericsson, Hungary*)
- **Carrier Ethernet "label" scalability**  
Luis Caro (*University of Girona, Spain*); Dimitri Papadimitriou (*Alcatel Bell, Belgium*); Jose Marzo (*Universitat de Girona, Spain*)
- **Hierarchical Routing on Unstructured Identifiers**  
Gábor Németh, János Tapolcai (*Budapest University of Technology and Economics, Hungary*); András Császár (*Ericsson Research, Hungary*)
- **End-to-End Delay Constrained Routing and Admission Control for MPLS Networks**  
Steven Chamberland (*Ecole Polytechnique de Montreal, Canada*)

NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

- **Reducing total call-blocking rates by flow admission control based on equality of heterogeneous traffic**  
Sumiko Shirata, Katsunori Yamaoka, Yoshinori Sakai  
(Tokyo Institute of Technology, Japan)

YBL ROOM

## C2

### Resilience Schemes – Re-Routing, Recovery, Protection

*Chair: Michal Pióro, Warsaw University of Technology, Poland*

- **Addressing robust Next-Generation Networks**  
Gianmarco Panza, Glauco Bigini, Michele Prudente  
(CEFRIEL, Italy); Pietro Belotti (Politecnico di Milano, Italy)
- **Method for Rapid Recovery Path Computation on Mesh IP Network**  
Masayuki Tsujino, Ryutaro Matsumura, Masayuki Inoue, Motoi Iwashita (NTT, Japan)
- **Flow optimization in IP networks with fast proactive recovery**  
Mateusz Dzida, Michal Zagozdzon, Mateusz Zotkiewicz, Michal Pioro (Warsaw University of Technology, Poland)
- **Fast Service Recovery under Shared Protection in Survivable WDM Networks with Limited Wavelength Conversion Capability**  
Jacek Rak (Gdansk University of Technology, Poland)

2008. 09. 30.

## 19:00

**Get Together** will take place in the Ladik Csárda Restaurant coast the Danube. Dinner will be served and short cultural folklore program will complete the evening.

*Meeting point:* in the dock of Danubius Grand Hotel Margitsziget at 18.50. Boarding **at 19.00.**

Transfer will be offered for participants of the event from the restaurant to the preferred hotels of Networks 2008.

The program is included in the registration fee.

### NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK STRATEGY AND PLANNING SYMPOSIUM

Wednesday, October 1, 2008

9.00 – 10.30

STAR ROOM

P3

## Wireless Communications

*Chair and moderator:* Alberto Ciarniello, *Telecom Italia Mobile*

Keynote speakers

- István Maradi, *CTO, Magyar Telekom*
- Niklas Carlheim-Müller, *Ericsson*

11:00 – 12:30

STAR ROOM

A3

## Wireless Networks: Optimising Scarce Resources

*Chair:* László Zombory, *BME-HVT, Hungary*

- **Optimisation Methods for Dynamic Frequency Planning in OFDMA Networks**  
David López-Pérez (*University of Bedfordshire, United Kingdom*); Alpár Jüttner (*Ericsson Research, Hungary*); Jie Zhang (*University of Bedfordshire, United Kingdom*)
- **Capacity Evaluation for Multi-Layer GSM Networks with Voice and Data Traffic**  
Kurt Majewski (*Siemens AG., Germany*); Andrzej Maciolek (*Nokia Siemens Networks, Germany*)
- **Concatenation of Space-Time Block Codes and LDPC Codes**  
Fatemeh Afghah (*Khajeh Nasir Technical University, Iran*); Abolfazl Razi (*Mobile company of IRAN, Iran*); Mehrdad Ardebilipour (*Khajeh Nasir University, Iran*)
- **Finding Optimum Clustering for Wireless Sensor Networks**  
YounHo Lee (*Sungkyunkwan University, Korea*)

2008. 10. 01.

NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

**B3****Routing over WDM Optical Networks**

Chair: Géza Paksy, *BME-TMIT, Hungary*

- **Benchmarking RWA Strategies for Dynamically Controlled Optical Networks**  
Arie M. C. A. Koster (*University of Warwick, United Kingdom*); Sarah Ruepp (*Technical University of Denmark, Denmark*)
- **Coordinated Network Management and Control System for Reservation and Real-time Light-Path Provisioning**  
Kazuhiya Yamada (*NTT Network Innovation Laboratories, Japan*); Yukio Tsukishima (*NTT, Japan*); Kazuhiro Matsuda (*NTT Corporation, Japan*); Masahiko Jinno (*NTT Network Innovation Laboratories, Japan*)
- **Practical Approaches to Improve the Efficiency of Provisioning Oriented Optical Networks**  
Tamas Karasz (*Budapest University of Technology and Economics, Hungary*)
- **Optimized synergy between 10 Gb/s and 40 Gb/s channels on a partially transparent network**  
Annalisa MOREA, Thierry Zami, Florence Leplingard, Dominique Bayart (*Alcatel-Lucent, France*)

**C3****Designing Reliable Networks**

Chair: Bernard Liau, *France Telecom, France*

- **An Efficient Algorithm for Designing Reliable IP Networks with an Access/Edge/Core Hierarchical Structure**  
Steven Chamberland (*Ecole Polytechnique de Montreal, Canada*)
- **Network Topology Design Considering Detour Traffic Caused by Link Failure**  
Noriaki Kamiyama, Ryoichi Kawahara (*NTT Service Integration Laboratories, Japan*); Hideaki Yoshino (*NTT, Japan*)
- **Efficient and Scalable Design of Protected Working Capacity Envelope**  
Brigitte Jaumard, Samir Sebbah (*Concordia University, Canada*)
- **Designing Reliable WDM Networks - A Global Approach**  
Steven Chamberland (*Ecole Polytechnique de Montreal, Canada*); Abderraouf Bahri (*Ecole Polytechnique, Canada*)

14:00 – 15:30

STAR ROOM

## A4

### Mobile Networks: Mobility, Management

Chair: Sándor Imre, BME-HIT, Hungary

- **A Client-driven Mobility Frame System - Mobility Management From a New Point of View**  
Benedek Kovacs, Péter Fülöp, Sándor Imre (*Budapest University of Technology and Economics, Hungary*)
- **Precise Location Prediction Algorithms Using Improved Random Walk-based and Generalized Markovian Mobility Models**  
Tamás Szálka (*Budapest University of Technology and Economics, Hungary*)
- **Remote Management of Mobile Devices with DSL Forum's TR 069**  
Frank den Hartog, Ben Hillen, Igor Passchier, Edwin Matthijssen (*TNO, The Netherlands*); Franklin Selgert (*KPN, The Netherlands*)
- **Access Transmission Network Upgrade in a Nationwide Mobile Network Modernization Project for EDGE Deployment**  
Attila Gábor Hilt (*Nokia Siemens Networks Magyarország Kft., Hungary*); Péter Petrás (*Nokia Siemens Networks Hungary Kft., Hungary*); Dean Emsley (*Nokia Siemens Networks (Schweiz) AG., Switzerland*); Grzegorz Rybarczyk (*Nokia Siemens Networks Poland, Hungary*)

MAGNOLIA ROOM

## B4

### Service & Technology Drivers for Optical Networks

Chair: Andy Valdar, University College London, UK

- **Migrating to a Next Gen WDM Core Network**  
Olivier Renais, Gaëlle Yven (*Orange Labs, France*); Esther Le Rouzic (*France Telecom, R&D division, France*)
- **All-optical networks and switching technologies for a 3D videoconference system with feeling of presence**  
Andrea Blanco Redondo (*ROBOTIKER - Tecnalía, Spain*); Enrique Areizaga (*Robotiker, Spain*); Joseba Zubía Zaballa (*University of the Basque Country, Spain*)

NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

- **Cost and Time Trade-off of Scheduling GRID Tasks over Grooming Capable Networks**  
József Gál, Norbert Szabó, Ákos Ladányi, Tibor Cinkler  
*(Budapest University of Technology and Economics, Hungary)*
- **Dispersion Elimination and Harmonic Behavior in Optical Networks**  
Eszter Udvary *(Budapest University of Technology and Economics, Hungary)*; Attila Gábor Hilt *(Nokia Siemens Networks Magyarország Kft., Hungary)*; Tibor Bercei *(Budapest University of Technology and Economics, Hungary)*

YBL ROOM

## C4

### Network Security – Attack, Intrusion and Authentication

*Chair: Wilfried Wieser, T-Systems, Germany*

- **An Advanced Timing Attack Scheme on RSA**  
Rudolf Tóth, Zoltán Faigl, Máté Szalay, Sándor Imre  
*(Budapest University of Technology and Economics, Hungary)*
- **Experimental Evaluation of the Performance Costs of Different IKEv2 Authentication Methods**  
Zoltán Faigl *(Budapest University of Technology and Economics, Hungary)*; Stefan Lindskog *(Norwegian University of Science and Technology, Norway)*; Anna Brunstrom *(Karlstad University, Sweden)*
- **A Model for Analysis of SYN Flood DoS Attacks**  
Nimal Nissanke, Jun Sun *(London South Bank University, United Kingdom)*
- **Kerckhoffs Principle for Intrusion Detection**  
Sasa Mrdovic, Branislava Perunicic *(University of Sarajevo, Bosnia and Herzegovina)*
- **Security Architectures for Mobile Integrated Pay-TV Conditional Access System**  
Hamidreza Shirazi *(Research Engineer, United Kingdom)*

2008. 10. 01.

16:00 – 17:30

STAR ROOM

## A5

### Migration towards FMC: Control & Addressing

Chair: László Pap, BME-HIT, Hungary

- **Load Control Techniques in SIP Signaling Servers Using Multiple Thresholds**  
Maurizio Pignolo (*Italtel, Italy*)
- **Architectural Model of Enterprise Multiservice Network Maintaining Mobility**  
Natalia Kryvinska (*School of Business, Economics and Statistics, University of Vienna, Austria*); Lukas Auer (*University of Vienna, Austria*)
- **The Concept and Model of Unique Name Service for Convergent Networks**  
Balazs Godor, Tamas Jakabfy (*T-Systems Business Services, Hungary*); Gyula Sallai (*Budapest University of Technology and Economics, Hungary*)
- **IPv4->IPv6 transition: Just to cut the Gordian Knot?**  
Geza Turchanyi (*Info-C Consulting, Hungary*); Janos Mohacsi (*Head of Network Engineering and Development, NIIF, Hungary*)

MAGNOLIA ROOM

## B5

### Multi-Layer Traffic Engineering

Chair: Achim Autenrieth, Nokia Siemens Networks, Germany

- **An Efficient and Practical Layer-preference Policy for Routing in GMPLS Networks**  
Péter Fodor, Gábor Enyedi, Gábor Rétvári (*Budapest University of Technology and Economics, Hungary*)
- **Benefits from 2-Layer Traffic Engineering for IP/MPLS Networks**  
Stefan Schnitter, Andreas Barth, Oana Schnitter (*T-Systems, Germany*)
- **Traffic Engineering in case of interconnected and integrated layers**  
Péter Hegyi, Tibor Cinkler (*Budapest University of Technology and Economics, Hungary*); Namik Sengezer, Ezhan Karasan (*Bilkent University, Turkey*)

NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK STRATEGY AND PLANNING SYMPOSIUM

- **Operational Databases-related Multi-Layer Network Modeling to Support Network Development at Magyar Telekom**

Emil Babics, Eva Csákány (*Magyar Telekom Telecommunications Plc., Hungary*); Tivadar Jakab (*Budapest University of Technology and Economics, Hungary*); Rozália Konkoly (*Magyar Telekom Telecommunications Plc., Hungary*); Lajos Szandi (*Budapest University of Technology and Economics, Hungary*)

YBL ROOM

## C5

### Optimising Network Operation

*Chair: Joachim Gross, Arcor, Germany*

- **The Embedding of an OSS into a comprehensive NGN Environment**

Herbert Goestl (*T-Systems, Germany*)

- **Using discrete event simulation to reduce operational expenses for a telecom operator**

Koen Casier (*University of Ghent, Belgium*); Sofie Verbrugge (*Ghent University - IBBT, Belgium*); Didier Colle, Mario Pickavet, Piet Demeester (*Ghent University, Belgium*)

- **A practical approach to network planning using both operational and optimization tools**

Nancy Perrot (*Orange Labs, France*)

- **Firewall Configuration Management Using XACML Policies**

Tugkan Tuglular, Fusun Cetin, Oguz Yarimtepe, Gurcan Gercek (*Izmir Institute of Technology, Turkey*)

## 19.00

**Gala Dinner** will take place on the Gróf Széchenyi Conference Boat with a 3-hour boat trip on the River Danube. A dinner will be served for you on board, and a short music program will complete the evening, when you wish to take your eyes off from the night view of the illuminated city of Budapest and the surroundings.

Meeting point in the dock of Danubius Grand Hotel Margitsziget at 18.50. Boarding **at 19.00.**

The boat will return to the dock about at 22.00.

The program is included in the registration fee.

Thursday, October 2, 2008

9:00 – 10:30

STAR ROOM

**A6**

## **Multi-Service and Multi-Layer Network Strategy and Design**

*Chair: Tamás Henk, BME-TMIT, Hungary*

- **Broadband Internetworking Technologies Services Convergence for Competitiveness and Telecommunications Market Evolution in Mexico**  
*Gerardo Chavez (IEEE Mexico Council, Mexico)*
- **Business case evolution across technology and services**  
*Robin Bailey (Analysys Consulting, United Kingdom)*
- **Next Generation Networks MultiService Network Design**  
*Deirdre Doherty, Tom Morawski, Raymond Sackett, Benjamin Tang, Carlos Urrutia-Valdes, John Zhao (Alcatel-Lucent, USA)*
- **FLEXPLANET, a Flexible Multi-Layer Network Design Tool**  
*Zoltán Zsóka, Laszlo Jereb (Budapest University of Technology and Economics, Hungary); Ferenc Unghvary (University of Texas at Dallas, USA)*
- **Performance Evaluation of Cross Layer Adaptive Multimedia Transmission: The case of Wired Networks**  
*Christos Bouras (University of Patras, Greece)*
- **Improvement of VoIP QoS parameters in comparison to IP TV requirement in Next Generation Broadband Ethernet network**  
*Mohammad Reza Sheikhattar (ITRC, Iran)*

MAGNOLIA ROOM

**B6**

## **Multi-Domain Networks**

*Chair: Bernard Jarry-Lacombe, France Telecom - Orange, France*

- **Distributed Fault Localization for Multi-Domain All-Optical Networks without Power Monitoring**  
*Mazen Khair, Jun Zheng, Hussein Mouftah (University of Ottawa, Canada)*

NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

- **A Concept of Inter-AS Priority Signaling using BGP Attributes**  
Thomas Martin Knoll (*Chemnitz University of Technology, Germany*)
- **PILEP: a contribution to PCE-based interdomain path computation**  
Manuel Domínguez-Dorado, José Luis González-Sánchez (*University of Extremadura, Spain*); Jordi Domingo-Pascual (*Technical University of Catalunya (UPC) Advanced Broadband Communications Center, Spain*)
- **SMC-BFS: An efficient algorithm for AS path Inference**  
Guoqiang Zhang (*China Internet Information Center, Chinese Academy of Sciences, P.R. China*)

YBL ROOM

## C6

### Bandwidth Allocation and TCP

Chair: Géza Gordos, *BME, NHIT, BZAKA, Hungary*

- **Network Capacity Analysis Using Dynamic Simulation**  
Gerard O'Reilly (*LGS, Bell Labs Innovations, USA*)
- **Bandwidth Dimensioning in Packet-based Aggregation Networks**  
Wolfram Lautenschläger, Wolfgang Frohberg (*Alcatel-Lucent Deutschland AG, Germany*)
- **A Large Scale Data Transfer Method with a Dynamic Window Control to Reduce Reservation Bandwidth in Diffserv AF Networks**  
Naoto Ikeda (*Osaka University, Japan*); Masaaki Noro (*Fujitsu Laboratories Ltd., Japan*); Ken-ichi Baba, Shimojo Shinji (*Osaka University, Japan*)
- **Analysis and Improvement of Transport Protocol Fairness**  
David Tegze, Csaba Horváth, Gábor Hosszú, Ferenc Kovács (*Budapest University of Technology and Economics, Hungary*)
- **Understanding the Impacts of Short-Term Dynamics on Long-Term Fairness of Competing High Speed TCP Flows: A Root-Cause Analysis**  
Balázs Sonkoly, Tuan Trinh, Sándor Molnár (*Budapest University of Technology and Economics, Hungary*)

2008. 10. 02.

NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

11:00 – 12:30

STAR ROOM

**A7**

## Evolution of NGN Services

*Chair: Akiya Inoue, Chiba Institute of Technology, Japan*

- **Converged Communication Services and Competition in Consumer Markets**  
*Abdol Saleh (Alcatel-Lucent, USA)*
- **Economic of Video Telephony and VoIP over EV-DO Revision A**  
*Narayan Raman, Yadhav Krishnan (Alcatel-Lucent, USA)*
- **Optimizing Costs of Migration to NGNs**  
*David Mongeau (Alcatel-Lucent, USA), Rajan Govinda (Alcatel-Lucent, Netherlands)*
- **Telco goes for IT - A Service Oriented IT Infrastructure for Next Generation Networks**  
*Guido Carls, Birgit Frohnhoff (Arcor AG & Co KG, Germany)*

MAGNOLIA ROOM

**B7**

## Multi-Cast Schemes

*Chair: József Bíró, BME-TMIT, Hungary*

- **Evaluation of MPLS P2MP Distribution Tree Algorithms**  
*Ryutaro Matsumura, Masayuki Tsujino, Masayuki Inoue, Motoi Iwashita (NTT, Japan)*
- **Network Resilience Requirements and Algorithms for Multicasting and Broadcasting Digital TV**  
*Juan Fernández-Palacios, Raúl Duque (Telefónica I+D, Spain); Javier Aracil (Universidad Autonoma de Madrid, Spain); Rupert Gruenzinger (Alcatel-Lucent, Germany); Tibor Cinkler, Péter Soproni, Marcell Perényi, János Tapolcai, Péter Fodor, András Gulyás, Gyula Sallai (Budapest University of Technology and Economics, Hungary); José Alberto Hernández (Universidad Autonoma de Madrid, Spain)*

2008. 10. 02.

NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

- **A Proposed Novel Thematic-Based Approach to the Group Communication**  
Raymond Pardede, Csaba Horváth, Gábor Hosszú, Ferenc Kovács (*Budapest University of Technology and Economics, Hungary*)
- **Modeling and Simulation of the Performance of Distributed Video Services**  
Peter Karpati (*Norwegian University of Science and Technology, Norway*); Tibor Szkaliczki (*Computer and Automation Research Institute, Hungarian Academy of Sciences, Hungary*); Laszlo Böszörményi (*University Klagenfurt, Austria*)

YBL ROOM

## C7

### Traffic Analysis and Modelling

*Chair:* Hideaki Yoshino, *NTT, Japan*

- **Traffic Estimation with Short-Term Fluctuating Component**  
Takeshi Kurosawa, Takehiro Kawata, Motoi Iwashita, Masayuki Tsujino (*NTT, Japan*)
- **PBoT: An Analytical Model of P2P Traffic Based on Transactions**  
Francisco Javier Ramón-Salguero, Gerardo García de Blas (*Telefónica I+D, Spain*); María Luisa García Osma (*Telefónica, Spain*); Adrián Maeso Martín-Carnerero, José Enríquez-Gabeiras (*Telefónica I+D, Spain*)
- **Sound Excerpt Based Similarity Search in P2P Applications**  
Gábor Richly, Gábor Hosszú, Ferenc Kovács (*Budapest University of Technology and Economics, Hungary*)
- **Fuzzy Traffic Engineering with Applications to Network Revenue Management**  
Wuyi Yue (*Konan University, Japan*)

**14.00 – 15.30**

**STAR ROOM**

**P4**

## **Closing Plenary Session**

*Chair: Tibor Cinkler, Chair of Technical Program Committee, BME-TMIT, Hungary*

Keynote speakers

- Bernard Jarry-Lacombe, *France Telecom – Orange*:  
**A strategy based on fixed/mobile convergence and IMS**
- Andy R. Valdar, *University College London*:  
**What's driving the adoption of next generation network (NGN) and next generation access (NGA) - and how do the key messages from networks relate to this?**

Best Paper Award

*Oscar Gonzales-Soto, ITU Consultant, Spain*

Introduction of Networks 2010

*Michal Pioro, Warsaw University of Technology, Poland*

Closing Words

*Gyula Sallai, Chair of International Management and Scientific Committee, BME-TMIT and HTE, Hungary*

# GENERAL INFORMATION

---

## CONFERENCE SECRETARIAT

### Scientific Association for Infocommunications HTE

*Address:* Kossuth Lajos tér 6-8, H-1055 Budapest, Hungary

*Phone:* +36 1 353 1027 ~ *Fax:* +36 1 353 0451

*E-mail:* info@hte.hu

**www.networks2008.org**

## REGISTRATION SECRETARIAT

Ms. Júlia Csesznok

### ASSZISZTENCIA Congress Bureau

*Address:* Hegedűs Gy. u. 20, H-1136 Budapest, Hungary

*Phone:* +36 1 350 1854 ~ *Fax:* +36 1 350 0929

*E-mail:* networks@asszisztencia.hu

**www.asszisztencia.hu**

## CONFERENCE VENUE

The venue of Networks 2008 is the **Danubius Health Spa Resort Margitsziget**

([www.danubiushotels.com/margitsziget](http://www.danubiushotels.com/margitsziget)).



The Hotel is situated on Budapest's Margaret Island, adjacent to Danubius Grand Hotel Margitsziget, connected to it by an underground corridor. Services of both hotels are at our guests' disposal.

Margaret Island was originally three separate islands that were joined together in the 19<sup>th</sup> century.

The island, which stretches for 4 kilometres, is a protected leafy botanical parkland with ancient trees, a Japanese Garden, a Rose Garden, an open-air amphitheatre, walking and jogging tracks. The island is car-free (hotel guests can enter the island), peaceful and perfectly placed in the middle of the city, between Pest and Buda, on the River Danube.

## NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

## REGISTRATION FEES\*

	Early EUR	Late EUR	Early HUF	Late HUF**
Non IEEE/HTE Member	500	700	120.000	168.000
IEEE/HTE Member	400	600	96.000	144.000
Student Non Member (incl. the tutorial)	250	300	60.000	72.000
Student Member (incl. the tutorial)	200	250	48.000	60.000

### TUTORIAL - REGISTRATION

Non IEEE/HTE Member	100	150	24.000	36.000
IEEE/HTE Member not registered to conf.	50	50	12.000	12.000
IEEE/HTE Member registered to conf.	Free	Free	0	0
Student	Free	Free	0	0

### EXTRA ITEM

Extra Proceedings	50	50	12.000	12.000
Extra Get Together	50	50	12.000	12.000
Extra Gala Dinner	100	100	24.000	24.000

\*Registration fee includes Get Together, Gala Dinner

\*\*Hungarian Participants pay in Hungarian Forint

## PAYMENT

Registration fees and hotel deposit must be paid to ASSZISZTENCIA Congress Bureau Ltd. in advance, either by bank transfer or by credit card in Euros only.

### Bank transfer (bank draft)

Payable to: ASSZISZTENCIA Kft.

Bank: Erstebank Zrt. H-1132 Budapest, Váci út 48.

Swift code: GIBAHUHB

Account number: HU37 1160 0006-0000 0000-2134 3919

Reference: "Networks" and participant's name

## NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

## **Credit card mail order**

VISA, Mastercard, Eurocard or American Express cards are accepted. Complete the Credit Card Authorization Form and return it by fax or by mail to the Registration Secretariat.

Please do not send credit card details via E-mail as we need your signature for the authorization!

## **Participants from Hungary**

Participants from Hungary should pay the registration fee to HTE. Based on the given billing information HTE will issue a taxable invoice in Hungarian Forints indicating the bank account details for the bank transfer. In this case please do not make any payments without invoice.

## **CANCELLATION POLICY**

Cancellations will only be accepted in writing addressed to ASSZISZTENCIA Congress Bureau Ltd (Registration Secretariat). Requests for refund will be accepted according to the postmark date or the date stamp of the fax or E-mail. Please indicate all bank details and codes where repayment should be forwarded.

## **Cancellation of registration fees**

Cancellation fee is 20 % of the total amount, if notification is received before September 1, 2008 CET 24:00. No refund will be made if cancellation note arrives after that date; however attendant substitution is accepted. In case of cancellation the final program and Proceedings will be sent.

## **PROCEEDINGS**

All Papers of all thirteen Networks conference from 1980 to 2008 are included into this Pendrive Proceedings of Networks 2008.

Additional Pendrive Proceedings are available at the registration desk at a fee of € 50.

## EXHIBITION

An exhibition and tools demonstration will be held during Networks 2008 in the same place as the Symposium, Danubius Health Spa Resort Margitsziget, Budapest in Room Jázmin I-II. The exhibition will run in parallel with the Symposium.

The exhibition and tools demonstration is planned to give you the opportunity to present the latest developments in hardware and software.

### List of Exhibitors

3M Hungary Kft., *Hungary*

ALBACOMP, *Hungary*

ANALYSYS MASON LTD., *United Kingdom*

DETECON INTERNATIONAL GMBH, *Germany*

D-LINK (MAGYARORSZÁG) KFT., *Hungary*

ELSINCO BUDAPEST, *Hungary*

ERICSSON MAGYARORSZÁG KFT., *Hungary*

HUAWEI TECHNOLOGIES HUNGARY KFT., *Hungary*

MOBILE INNOVATION CENTRE, *Hungary*

### Exhibition Hours

**September 28 – October 1**

9.00 – 17.30

**On October 2**

9.00 – 15.30

## SOCIAL PROGRAMME

- The Conference Welcome Reception will be organized on September 29, 2008, Monday in Danubius Grand Hotel Margitsziget, Széchenyi Restaurant at 18.30. The attendance to the Welcome Reception is included in the registration fee. Welcome Speech by Gyula Sallai, Networks 2008 IMSC Chair and Gyula Csopaki, NKTH President.
- Get Together will take place in the Ladik Csárda Restaurant coast the Danube on September 30, 2008, Tuesday. Welcome by László Pap, National Advisory Board Chair. Dinner and short cultural folklore program will be served. Meeting point in the dock of Danubius Grand Hotel Margitsziget at 18.50. Boarding at 19.00. Transfer will be offered for participants of the event from the restaurant to the preferred hotels of Networks 2008. The program is included in the registration fee. Extra tickets can be ordered at a fee of € 50.

### NETWORKS 2008

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

- Gala Dinner will take place on the Gróf Széchenyi Conference Boat with a 3-hour boat trip on the River Danube on October 1, 2008, Wednesday, patroned by Ericsson Hungary Ltd. Welcome by Gábor Ery, Ericsson Hungary, CEO. A dinner will be served for you on board, and a short music program will complete the evening, when you wish to take your eyes off from the night view of the illuminated city of Budapest and the surroundings. Meeting point in the dock of Danubius Grand Hotel Margitsziget at 18.50. Boarding at 19.00. The boat will return to the dock about at 22.00. The program is included in the registration fee. Extra tickets can be ordered at a fee of € 100.

## **OFFICIAL LANGUAGE**

The official language of Networks 2008 is English, only.

## **INTERNET ACCESS**

WLAN Support will be available on the venue of Networks 2008 free of charge by Wiera Ltd.

If you need help, please contact the registration desk all day from 8.00 to 12.00.

## **ABOUT HUNGARY**

Situated at the crossroad of East and West Europe, sustaining original traditions and culture in the course of a unique history of glories and tragedies Hungary offers special regions and monuments on the UNESCO World Heritage worth to be visited.

## **ABOUT BUDAPEST**

There are those who fall in love with the city at first sight and those who only warm up after a longer relationship, still everyone agrees that it is one of the most beautifully situated cities in the world. The great river Danube cuts it in two, and separates the hills and valleys of the western, Buda side from the flat, Pest side in the east. The settlement of Buda is as old as the Conquest itself (896), but it only started to develop in the 13<sup>th</sup> century when King Béla IV built a castle on the hill for protection against the Mongol attacks. The court moved to Buda in 1347, and the castle was enlarged into a palace in the Gothic style of the time. During the reign of King Matthias it became a dazzling Renaissance royal residence. Partially based upon its ruins the palace was enlarged in its present baroque style. The city Budapest was born in 1873 with the unification of Buda, Óbuda and Pest, for which a new, representative royal palace was built. Out of the seven road bridges four are part of the World Heritage.

### **NETWORKS 2008**

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

## USEFUL INFORMATION ABOUT HUNGARY

### TRAVELLING TO BUDAPEST

**By airplane:** MALÉV, Hungarian Airlines connects 44 cities in 32 countries with the Hungarian capital but almost all international European airlines also fly to Budapest. Travellers can get from the airport to the city centre by bus or by airport minibuses to any address within 40 minutes and at the most reasonable price.

**By train:** Trains from abroad arrive at three international railway stations at each of which there is a metro station.

**By bus:** The Hungarian bus company Volánbusz runs scheduled buses from 14 countries.

**On the river:** From April to October a hydrofoil runs on the Danube between Vienna and Budapest via Bratislava.

**By car:** All main roads marked with single digit lead to Budapest. There is a toll on certain sections of the M1, M3 and M5 motorways. Speed limits are 130 kph on motorways, 110 kph on main roads, 90 kph on other roads and 50 kph in built-up areas.

### LOCAL TRANSPORTATION

To discover Budapest you can use different means of transport such as metro, bus, tram, trolley bus and HÉV (suburban train). The city centre is linked to the City Park by the 100-year-old underground railway, the first on continental Europe. The funicular railway takes you up to the Buda Castle, and the chairlift and the cogwheel railway to the Buda Hills.

Tickets must be bought in advance from ticket offices, tobacconists', news agents' or automatic machines. Tickets must be validated on the vehicle or at the entrance to metro stations. Daily, weekly and monthly season tickets are available or you can use the Budapest Card as a ticket.

### TRANSPORT TO THE AIRPORT

Airport Minibuses depart from Ferihegy Airport in every 10 minutes to all destinations in Budapest and they also pick you up at any hotel on your way back to the airport. The ride takes 20-40 minutes depending on traffic and your starting point. Current cost is € 13 one way.

### PUBLIC TRANSPORTATION

Budapest's network of public transport services includes buses, trolleybuses, trams, underground trains (Metró) and above-ground suburban trains (HÉV).

## Schedules

Buses, trams and trolleybuses run daily from 4.30 until 23.00. Once tram and metro service has ended for the night, there are night buses running along the major routes. Frequency is about every 25 minutes.

All three underground lines connect at Deák tér station. Service frequencies range from 15 minutes late in the evening to every two minutes at peak times.

The HÉV runs to and from Csepel Island and Ráckeve in the south, Szentendre in the north, and Gödöllő in the east. Once you get outside the Budapest city limits, you will need to buy a supplementary ticket, available from the conductor on board the train.

## Tickets purchasing

Tickets have to be bought before boarding. They are available at Underground stations, tobacco and news kiosks, and from vending machines at many bus and tram stops in the city center.

A new ticket has to be validated at the beginning of each journey, and this is done by inserting it into the slot in the small orange box situated at waist height near the doors of buses, trolleybuses, trams and HÉV trains, and before the escalators at metro stations.

Tickets are valid for one single journey of any length (without changing) on all routes (including the Cogwheel Railway, but excluding those parts of the HÉV that lie outside the metropolitan boundary of Budapest).

Special tickets can be purchased that allow a change of route, and that cover the HÉV outside Budapest.

There is also a range of pre-paid books of tickets and value-for-money passes.

There are lots of ticket inspectors: some are uniformed and others plain-clothed, but they always wear a blue armband and carry a photographic identification badge. They can ask to see tickets and passes on any vehicle and anywhere on the Underground system, including after you have got off – so please remember to validate your ticket and keep hold of it! Also, inspectors are wary of foreigners “playing dumb” with the ticket-validation process. Rest assured, they will not let you get away just because they don’t speak English!

You can find all the information related to public transport at **[www.bkv.hu](http://www.bkv.hu)**.

## TAXIS

### How to choose your taxi

Taxis have the word “Taxi” written on them and have yellow registration number plates. Be careful to choose a well marked

car with logos and not just a 'Taxi' sign on the top! By far the most common complaint of tourists in Budapest is being "taken for a ride" in a taxi and charged exorbitant fees.

It is compulsory for taxis to use a faremeter that can give a receipt. The price charged is calculated according to the distance travelled and will also include a fixed booking fee and (if appropriate) a waiting fee.

It is customary to give a tip of ten percent, depending on the level of satisfaction. The total charge to be paid by the passenger is made up of 3 separate parts:

- a basic charge of maximum 300 HUF during the day and maximum 420 HUF at night,
- a per-kilometre charge based on the total distance travelled (maximum 240 HUF/kilometre during the day, maximum 336 HUF at night),
- a waiting charge if applicable
- A transfer from the airport to the centre should not be more than around 4-5.000 HUF. The larger taxi companies often charge rates far lower than the maximum listed above.

Taxis are often cheaper if you call ahead than hailing one on the street. Make a note of the following companies, many of which should have an English-speaking operator. You will need to give your name and the address or approximate location to be picked up. Alternatively, if you call from a public phone, the operator should be able to trace exactly where you are.

### **Taxi companies in Budapest:**

City Taxi: +36 1 2 111 111

Taxi 2000: +36 1 2 000 000

6x6 Taxi: +36 1 2 666 666

Tele 5 Taxi: +36 1 5 555 555

Radio Taxi: +36 1 3 777 777

Budataxi: +36 1 2 333 333

Főtaxi: +36 1 2 222 222

### **BUDAPEST CARD**

With the Budapest Card you can use the Airport Minibus with a discount and you can travel free on public transport in the capital. It ensures free or reduced priced entrance to museums, the Zoo, the Fun Fair and the Buda caves. Sightseeing tours and numerous cultural events are also cheaper with it and certain restaurants, cafés and shops give reductions to card holders. The Budapest Card is valid for 48 or 72 hours and is available from Tourinform offices, bus and metro ticket offices and many travel agencies, hotels and museums.

#### **NETWORKS 2008**

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

## **LANGUAGE**

Official language of the country is Hungarian, but English and German are widely spoken.

## **CLIMATE**

The climate is continental. The weather in September is usually changeable; the average daytime temperature is 17° C.

## **ELECTRICITY**

Two-pin electric outlets (230 V, 50 Hz) are provided.

## **TELEPHONE**

Country code for Hungary is +36

Area code for Budapest is 1

Emergency: 112

Ambulance: 104

Fire Brigade: 105

Police: 107

Public telephones operate by phone card or coins. Cards are available at post offices and at tobacconists.

## **BANKING IN HUNGARY**

In Hungary banks are usually open between 8.00 – 16.00 on weekdays, although some close an hour earlier on Fridays. With the exception of some shopping mall bank branches, Hungarian banks are not open on Saturdays.

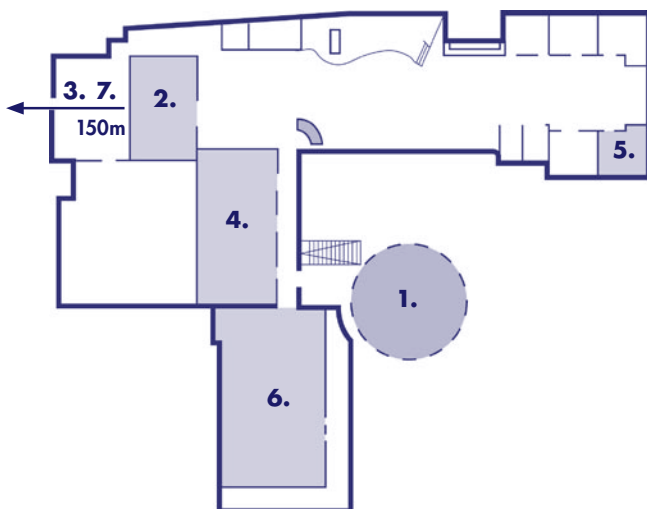
ATM machines and currency exchange machines are available throughout the country. However, beware of higher service charges for using ATMs that are not affiliated with your bank of origin. The credit cards used most often – Diners Club, Euro/MasterCard and VISA – can be used to withdraw cash from banks and ATM machines and to pay bills in hotels, restaurants and shops. Emblems at the entrance mark the shops where credit cards are accepted. Most banks have their own automated networks. You don't have to worry about buying Hungarian Forint ahead of time and carrying cash on you. ATM machines are widely available in major cities. You can also use your bank or credit card to get cash at post offices throughout Hungary. More than 3.200 post offices nationwide provide this service. Traveler's checks may be cashed in banks, but are not accepted in shops. They may also be exchanged at some downtown booths.

### **NETWORKS 2008**

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM

# MAP OF DANUBIUS HEALTH SPA RESORT MARGITSZIGET

---



- 1. Star Room (Plenary Room)**
- 2. Magnólia Room (Session Room)**
- 3. Ybl Room (Session Room in Grand Hotel)**
- 4. Jázmin I-II Room (Exhibition area)**
- 5. Toboz I. Room (VIP Room)**
- 6. Platán Restaurant (Lunch area)**
- 7. Széchenyi Restaurant (Lunch area in Grand Hotel)**

Ybl Room and Széchenyi Restaurant are situated in building of Danubius Grand Hotel Margitsziget about 150 meters far from the building of Danubius Health Spa Resort Margitsziget.

---

The Program Guide is patroned by

**Magyar Telekom Nyrt.**

H-1013 Budapest, Krisztina krt. 55.

Tel: +36 1 457 4000

Fax: +36 1 458 7176

[www.telekom.hu](http://www.telekom.hu)

**NETWORKS 2008**

13<sup>TH</sup> INTERNATIONAL TELECOMMUNICATIONS NETWORK  
STRATEGY AND PLANNING SYMPOSIUM



## In this very moment 322 people are seeing the world the same way.

59,000 are meeting a stranger. 125,000 people are kissing. And a lot of people are reading this advertisement. We have so much in common. Why could not the frontiers between us disappear? With Magyar Telekom you may easily share the community's experience. No matter whether you connect to us through a cable or via your mobile, whatever separates you, will disappear with us.

TV, Internet, telephone – at home and on the move.



Life is for sharing



Ericsson as the world's leading innovator in telecommunications has the industry's strongest commitment to research and development, with substantial contributions to various standards and around 23,000 granted patents worldwide shaping the telecommunications' world.

Ericsson Hungary is one of the largest telecommunications, information technology development and software design companies in Hungary. The chain of 'education – basic research – applied research – industrial realisation' is exemplary in Ericsson Hungary's activities.



**Ericsson Hungary**  
1037 Budapest, Laborc ut. 1.  
Tel.: +36 1 437 7100  
Fax: +36 1 437 7467  
[www.ericsson.com/hu](http://www.ericsson.com/hu)

**ERICSSON**   
TAKING YOU FORWARD