



SEE



NETWORKING 2000

IFIP-TC6/European Commission

Broadband Communications (BC)
High Performance Networking (HPN)
Performance of Communication Networks (PCN)



Paris, France
Cité des Sciences, La Villette
May 14 – 19, 2000

Organizer



Networking 2000 Event

- ▶ 11 tutorials.
- ▶ 8 mini-conferences (MWCN 2000, International Workshop...).
- ▶ Networking 2000 Conference.
- ▶ A European Commission Session.
- ▶ 2 meetings.

On May 16-18, the Networking-2000 conference will take place, with three parallel tracks. Three invited talks will be presented in plenary session. The tracks correspond to the three parallel conferences:

- ▶ **Broadband Communications (BC).**
- ▶ **High Performance Networking (HPN).**
- ▶ **Performance of Communication Networks (PCN).**

The three tracks will be open for every registered participant. Springer Verlag will provide the proceedings.

A book of 1000 pages for the three tracks will be edited and a CD distributed with the proceedings.

Papers will be available at the Springer-Verlag web site a week before the conference (www.springer.de).

Networking 2000 Conference will provide an international technical forum for experts from industry and academia with a view to exchanging ideas and presenting results on ongoing research in networking.

- ▶ BC (Broadband Communications): Paris 1995, Montreal 1996, Lisboa 1997, Stuttgart 1998, Hong-Kong 1999, **Paris 2000**.
- ▶ HPN (High Performance Networking): Aaren 1987, Liège 1988, Berlin 1990, Liège 1992, Grenoble 1994, Palma 1995, New York 1997, Vienna 1998, **Paris 2000**.
- ▶ PCN (Performance of Communication Networks): Paris 1981, Zürich 1984, Rio de Janeiro 1987, Barcelona 1990, Raleigh 1993, Lund 1998, **Paris 2000**.

Message from the steering committee chair

The Year 2000 deserves the organisation of exceptional events. **Networking 2000** intends to be one of them. With three international conferences in parallel tracks, three outstanding invited speakers, twelve tutorials and nine mini-conferences, **Networking 2000** will be THE first networking week of the millenium. You must be there.

Message from the Conference chair

A new generation of networks is arriving designed to support multimedia applications:

- ▶ Native IP networks with QoS protocols, smart flow control schemes, Gigabit routers and the new IP frame paradigm.
- ▶ Native ATM networks supporting direct API.
- ▶ Ethernet networks with new switched technologies.
- ▶ A superposition of such architectures, MPLS or others.

Networking 2000 conference will provide a large forum for discussing such problems. Paris, May 16-18, will be the place where to learn the most important technical issues and have some feedback from well known experts in the field of networking.



Global event schedule-at-a-glance

	Sunday May 14 - 2 pm	Monday May 15 - 9 am	Monday May 15 - 2 PM	Tuesday May 16	Wednesday May 17	Thursday May 18	Friday May 19
Secretariat	Secretariat	Secretariat	Secretariat	Secretariat	Secretariat	Secretariat	Secretariat
Room Gaston Berger				Networking 2000 Conference	Networking 2000 Conference	Networking 2000 Conference	
Room A	Tutorial: Mobile Software Agents for Telecom Services on Internet	Tutorial: Agents logiciels mobiles pour les services de télécom sur Internet (Fr)	Internet Room	Internet Room	Internet Room	Internet Room	Internet Room
Room B	Tutorial: New Developments in Internet Protocols and Architecture	Tutorial: Understanding DWDM Technology in Networks	Internet Room	Internet Room	Internet Room	Internet Room	Internet Room
Room C	Tutorial: Cellular IP Approaches	Tutorial: Mobile ad-hoc Networks	Tutorial: IP cellulaire (Fr)				
Room D	Tutorial: Algorithms for Forwarding Lookup and Filtering in High Performance Routers	Tutorial: Algorithmes de traitement dans les routeurs à haute performance (Fr)	Tutorial: Modern Distributed Application Development: CORBA, Servlets and XML				
Room Louis Armand		Internet and the Web		Networking 2000 Conference	Networking 2000 Conference	Networking 2000 Conference	European Commission Session
		Tutorial: Voice over IP: A Unified Solution for Internet and Intranet		Networking 2000 Conference	Networking 2000 Conference	Networking 2000 Conference	Quality of Service and Multimedia Applications
Room 1		Tutorial: Multimedia Enabling Technologies and Applications		2nd International Workshop MWCN 2000	2nd International Workshop MWCN 2000	Resource Allocation for Mobile Networks	Broadband Satellite Networking
Room 2		Tutorial: Understanding QoS		IATE Intelligent Agents for Telecom Environments	Programmable Networks and Active Networks Seminar	Control and Network Software in Internet	Multimedia Management
Room 3		Tutorial : Nouveaux développements dans l'architecture et les protocoles Internet (Fr)		Control and Network Software in Internet			COST 264 Meeting Group Communication
Room 4		Tutorial: Understanding SLA					
		Get Together Party			Gala Dinner		

Gala Dinner: Fashion parade in the famous large store in Paris, Le Printemps.



Tutorials

Twelve half-day and 3 full-day tutorials by leading industry and academia experts.

▶ FULL-DAY TUTORIAL 

Voice over IP: A Unified Solution for Internet and Intranet

Luigi Fratta, Politecnico di Milano

This course presents QoS issues for IP networks, architectures for Voice over IP and a short overview of products available.

▶ HALF-DAY TUTORIAL 

Modern Distributed Application Development: CORBA, Servlets and XML

Stefan Fischer, International University

In this tutorial, we introduce new concepts in distributed application development and present tools for real application developments.

▶ HALF-DAY TUTORIAL 

Understanding DWDM Technology in Networks

*Stamatios Kartalopoulos, Lucent Technologies/
Bell Laboratories*

DWDM systems at 40 Gbps per wavelength and thus at an aggregate Tbps is already reality. In this tutorial, we examine the physics and functionality of optical components that make DWDM possible.

▶ HALF-DAY TUTORIAL 

Understanding SLA

Lundy Lewis, Cabletron Systems

In this tutorial we provide a framework which serves as a baseline against which one may situate, evaluate, and/or execute SLA programs.

▶ HALF-DAY TUTORIAL 

Mobile ad-hoc Networks

Zygmunt J. Haas, Cornell University

The goal of the tutorial is to comprehensively expose the state of the art in ad-hoc networking.

▶ HALF-DAY TUTORIAL  

Mobile Software Agents for Telecommunication Services on Internet

Ahmed Karmouch, University of Ottawa

This tutorial will examine the current state of agent technology, which encompasses a broad range of research and development activities related to the field of agents.

▶ HALF-DAY TUTORIAL  

New Developments in Internet Protocols and Architecture

Christophe Diot, SPRINT ATL

The goal of this tutorial is to analyze the recent protocols proposed for standardization at IETF and from this observation, understand the evolution of the Internet service model and end-to-end architecture.

▶ FULL-DAY TUTORIAL 

Multimedia Enabling Technologies and Applications

Nicolas Georganas, University of Ottawa

This tutorial is for beginners in multimedia and its objective is to present the fundamentals of multimedia enabling technologies and services, and demonstrate some applications.

▶ FULL-DAY TUTORIAL 

Understanding QoS

Jagannath Shantigram, Nortel Networks

This tutorial will delve into the mechanics of providing QoS and also will give an indepth look at the different evolving standards to support QoS.

▶ HALF-DAY TUTORIAL  

Algorithms for Forwarding Lookup and Filtering in High Performance Routers

Ernst Biersack, Institut EURECOM

In this tutorial we will present the state of the art of the forwarding and filtering algorithms that have been developed in recent years and compare their performance and complexity.

▶ HALF-DAY TUTORIAL  

Cellular IP Approaches

Behcet Sarikaya, The University of Aizu

This tutorial will provide an overview of approaches to seamless integration of cellular networks with the Internet commonly known as Cellular IP.

 Tutorial in French.

 Tutorial in English.



Mini-conference

Internet and the Web

9:00 am

Opening: Keith Ross

- **A Carrier Perspective on Internet Services Research**

Timothy Roscoe and Christophe Diot Sprint AT&T

- **Scalable Document Access**

Pablo Rodriguez and Ernst Biersack, Eurecom

- **Mobile Agents and Mobile Code for the Internet**

Andrzej Duda, Ensimag

- **Multimedia Information Recommendation and Filtering on the Web**

Arnd Kohrs, Benoit Huet, and Bernard Merialdo, Eurecom

12:30-2:00 pm

Lunch

- **Quality of Service Differentiation and the Web**

James Roberts, FTR&D, France Télécom

- **Multimedia Adaptive Applications for the Internet**

M. Salmatian, ENST-Bretagne

- **Joint source and channel coding for video transmission over the Internet: An overview**

Christine Guillemot and Thierry Turletti, INRIA

- **Streaming Stored Video**

Philippe de Cuetos, Eurecom, Despina Saporilla, Eurecom/Upenn, Keith Ross, Eurecom

5:30 pm

End of the mini-conference

Networking 2000

10:00-10:30 am

Welcome address

10:30-11:00 am

Coffee Break

11:00-12:00 am

Chair: André Danthine

Keynote address: **A Framework for Managing Information in the Network Environment**

Robert E. Kahn, President, CNRI, USA

Robert E. Kahn is Chairman, CEO and



President of the Corporation for National Research Initiatives (CNRI), which he founded in 1986 after a thirteen year term at the U.S. Defense Advanced Research Projects Agency (DARPA). CNRI was created as a not-

for-profit organization to provide leadership and funding for research and development of the National Information Infrastructure. After receiving a B.E.E. from the City College of New York in 1960, Dr. Kahn earned M.A. and Ph.D. degrees from Princeton University in 1962 and 1964 respectively. He worked on the Technical Staff at Bell Laboratories and then became an Assistant Professor of Electrical Engineering at MIT. At Bolt Beranek and Newman he was responsible for the system design of the Arpanet, the first packet-switched network. In 1972 he moved to DARPA and subsequently became Director of DARPA's Information Processing Techniques Office (IPTO).

While Director of IPTO he initiated the United States government's billion dollar Strategic Computing Program, the largest computer research and development program ever undertaken by the federal government. Dr. Kahn conceived the idea of open-architecture networking. He is a co-inventor of the TCP/IP protocols and was responsible for originating DARPA's Internet Program which he led for the first three years. Dr. Kahn also coined the term National Information Infrastructure (NII) in the mid 1980s which later became more widely known as the Information Super Highway.

Dr. Kahn is the recipient of numerous awards including the 1997 National Medal of Technology awarded by President Clinton.

12:00-1:30 pm

Lunch

1:30-3:00 pm

Session 1 - Multicasting in Heterogeneous Networks

Chair: Serge Fdida

- **Multi-Criteria Arguments for Improving the Fairness of Layered Multicast Applications**
Marcelo Dias de Amorim, University of Versailles and University of Rio de Janeiro, Otto Carlos, M. B. Duarte, University of Rio de Janeiro, and Guy Pujolle, University of Versailles
- **Network-Driven Layered Multicast with IPv6**
Ho-pong Sze and Soung C. Liew, The Chinese University of Hong Kong



- **Analysis of the Requirements for ATM Multicasting Based on per-PDU ID Assignment**

Josep Mangués-Bafalluy and Jordi Domingo-Pascual, Polytechnic University of Catalunya

Session 2 - Performance of ATM Networks

Chair: Olga Casals

- **Sensitivity of ABR Congestion Control Algorithms to Hurst Parameter Estimates**

Sven A. M. Östring, Harsha Sirisena, and Irene Hudson, University of Canterbury

- **Providing GFR Guarantees for TCP/IP Traffic over APON Access Systems**

Saso Stojanovski, Maurice Gagnaire, and Rudy Hoebeke, ENST-Paris

- **Buffer Size Requirements for Delay Sensitive Traffic Considering Discrete Effects and Service-Latency in ATM Switches**

Steven Wright, BellSouth, and Yannis Viniotis, North Carolina State University and Orologic

Session 3 - Packet Switching Node Architectures

Chair: Daniel Kofman

- **Distributed Input and Deflection Routing Based Packet Switch Using Shuffle Pattern Network**

Thai Thach Bao, Hiroaki Morino, Hitoshi Aida, and Tadao Saito, University of Tokyo

- **A Distributed Dynamic Scheduling Algorithm for a Terabit Multicast Packet Switch**

Feihong Chen, Necdet Uzun, and Ali N. Akansu, New Jersey Institute of Technology

- **An Interworking Call Control Solution for a Multidiscipline Switch**

Pertti Raatikainen, VIT Information Technology Telecommunications, and Sami Raatikainen, Helsinki University of Technology

3:00-3:15 pm

Break

3:15-4:45 pm

Session 4 - Multicasting I

Chair: Jon Crowcroft

- **Generic Multicast Transport Services: Router Support for Multicast Applications**

Brad Cain, Nortel Networks, and Don Towsley, University of Massachusetts

- **RP-Based Multicast Receiver Access Control for PIM-SM**

Thomas Hardjono, Nortel Networks

- **An Algorithm for Multicast with Multiple QoS Constraints and Dynamic Membership**

Aiguo Fei and Mario Gerla, University of California, Los Angeles

Session 5 - QoS and Traffic Issues

Chair: Augusto Casaca

- **Invited talk: Tradeoffs in Networks with End-to-End Statistical QoS Guarantees**

Jorg Liebeherr, Erhan Yilmaz and Stephen Patek, University of Virginia

- **Optimal Traffic Partitioning in MPLS Networks**

Esmael Dinan, D.A. Auduche, and Bijan Jabbari, George Mason University

- **Impact of the Ethernet Capture Effect on Bandwidth Measurements**

Mats Björkman and Bob Melander, Uppsala University

Session 6 - Optical Networks

Chair: Peter Key

- **Statistical Study of the Correlation Between Topology and Wavelength Usage in Optical Networks With and Without Conversion**

Christian Fenger, Tele Danmark, Emmanuel Limal and Ulrik Gliese, Research Center COM, and Cathal J. Mahon, Tele Danmark

- **Computing Blocking Probabilities in Multi-Class Wavelength Routing Networks**

Sridhar Ramesh, George Rouskas, and Harry Perros, North Carolina State University

- **A comparative Study of Mesh and Multi-ring Designs for Survivable WDM Networks**

T. Iamvasant, C. Bawornatummarat, and L. Wuttisittikulij, Chulalongkorn University

4:45-5:00 pm

Coffee break

5:00-6:00 pm

Session 7 - Multicasting II

Chair: Arne Nilsson

- **Membership-Insensitive Totally Ordered Multicast: Properties and Performance**

Jerzy Konorski, Technical University of Gdansk

- **On Finding Feasible Solutions to the Group Multicast Routing Problem**

Ning Wang and Chor Ping Low, Nanyang Technological University

Session 8 - TCP/IP over ATM

Chair: Tadao Saito

- **Analysis of Cell Spacing on a TCP Flow Mapped onto an ATM Connection.**

Fabrice Guillemin, Jacqueline Boyer, Olivier Dugeon, and Christophe Mangin FTR&D

- **Mapping of Loss and Delay Between IP and ATM Using Network Calculus**

Tijani Chahed, Gerard Hebuterne, and Caroline Fayet, Institut National des Télécom.

Session 9 - Traffic with Long Range Dependencies

Chair: Demetres Kouvatsos

- **A Self-Similar Point Process Through Fractal Construction**

Manjunath A. Krishnam, Anand Venkatachalam, and Jeffrey M. Capone, Arizona State University

- **Tail Transitions in Queues with Long Range Dependent Input**

Tim Daniëls and Chris Blondia, University of Antwerp



Mini-conferences

Second International Workshop on Mobile and Wireless Communications Networks (MWCN 2000)

In co-operation with ACM SIGMOBILE, the IEEE ComSoc Technical Committee on Communication System Integration and Modelling.

9:00 am

Opening Remarks: G. Omidyar

9:05-10:00 am

- Keynote Speech I: Pervasive Networking and Bluetooth

Mahmoud Naghshineh, IBM Thomas J. Watson Research Center, USA

10:00-10:30 am

Session 0 - Indoor Wireless Networking

- An Overview of Wireless Indoor Geolocation Techniques and Systems
Kaveh Pahlavan and Xinrong Li, Worcester Polytechnic Institute - M. Ylianttila, R. S. Chana, M. Latva-aho, University of Oulu

10:30-11:00 am

Coffee Break

11:00-12:30 am

Session 1 - Multiple Access Techniques for Wireless Ad-Hoc Networking

Chair: Khaled Elsayed, Cairo University, Egypt

- Priority Based Multiple Access for Service Differentiation in Wireless Ad-Hoc Networks
Y. Wang and B. Bensaou, National University of Singapore, Singapore

- Survivability Analysis of Ad-Hoc Wireless Network Architecture
K. Paul, CTS, R. RoyChoudhuri, Haldia Institute of Technology, S. Bandyopadhyay, Pricewaterhouse Coopers Ltd, India

- A Token Passing Tree MAC Scheme for Wireless Ad-Hoc Networks to Support Real-Time Traffic

J. Shengming, R. Jianqiang and H. Dajiang, National University of Singapore, Singapore

12:30-2:00 pm

Lunch

2:00-3:30 pm

Session 2 - Telephony over Packet Switched Networks

Chair: Prathima Agrawal, Telecordia, USA

- Challenges for Mobile Voice-over-IP
Prathima Agrawal, Jyh-Cheng Chen, Telcordia Inc. Cormac J. Sreenan, University College Cork

- Cellular IP Performance
Andrew T. Campbell, Columbia University

- Smart Delivery of Multimedia Content for Wireless Applications

Theo Kanter, Per Lindtorp, Christian Olrog, Ericsson Radio Systems, Sweden and Gerald Q. Maguire Jr, KTH, Sweden

3:45-6:15 pm

Session 3 - IP Networks Versus Conventional Switched Networks

Chair: Pascal Lorenz, Université de Haute Alsace, France

- IP versus ATM: the fight is over! IP and ATM entered a complete Collaboration inside the switches.

S. Ritzenthaler, Newbridge, France

- IPv6 : The Solution for Future Universal Networks

S. Rao, Telscom, Switzerland

4:45-5:15 pm

Coffee Break

5:15-6:15 pm

- Performance measurement methodologies and Quality of Service evaluation In VoIP networks

H. Tobiet, NMG Telecoms, and Pascal Lorenz, Université de Haute-Alsace, France

- The Role of MPLS (MultiProtocol Label Switching) in migrating from Today's Conventional Switched Networks to the New World's IP networks

F. Le Faucheur, Cisco

6:15-6:30 pm

Planning for the next year MWCN conference.

IATE - Intelligent Agents for Telecom Environments

9:00-12:30 am

Opening Remarks:

Dominique Gaiiti and Olli Martikainen

- Intelligent agents and multiagent systems
Jacques Ferber, University of Montpellier

- Network Intelligence Middleware: a Platform Concept for Enabling the Service and Networking Convergence

Pasi Kemppainen, Lappeenranta

- Mobile agents

Robert Ghanea Hercock, BT

- Software Agents in Mobility Support and Service Selection

Kirsi Valtari, Helsinki

12:30-2:00 pm

Lunch

2:00-5:30 pm

- Security for Mobile Agents

Fritz Hohl, University of Stuttgart

- Mobile WAP and WTA Service Management

Mika Andersson, Helsinki

- Service Distribution and Security

Juhana Räsänen, Helsinki

- A Monitoring Model Using Intelligent Agents

Karina Marcus, Eurecom Institute

- P1520 Architecture

Jean Francois Huard, New York

- Agents in Telecommunication-based Services

Mihhail Matskin, Norwegian University of Science and Technology, Trondheim

Springer Verlag will provide the proceedings of MWCN 2000



Networking 2000

9:00-10:30 am

Session 10 - Congestion Control in Broadband Multicast Networks

Chair: Villy Iversen

- **An Exact Algorithm for Calculating Blocking Probabilities in Multicast Networks**
Eeva Nyberg, Jorma Virtamo, and Samuli Aalto, Helsinki University of Technology
- **Approximations for Call-Blocking Probabilities in Multirouting Multicasting Multirate Loss Networks**
Tibor Cinkler and Laszlo Ast, Technical University of Budapest
- **Consolidation Algorithm Interoperability in Point-to-Multipoint ABR Services in ATM Networks**
Naris Rangsinoppamas, T. Jaruvitayakovit, W. Sa-niamsak, P. Pavarangoon, and P. Prapinmongkolkarn Chulalongkorn University

Session 11 - QoS and Signalling

Chair: Ulf Körner

- **Evaluation of the INSIGNIA Signaling System**
Seoung-Bum Lee, Gahng-Seop Ahn, Xiaowei Zhang and Andrew T. Campbell, Columbia University
- **Design and Implementation of RSVP based on Object-Relationships**
Martin Karsten, Darmstadt University of Technology

- **Indirect RSVP for Virtual Cluster Cellular Mobile IP Networks**
Yu Zeng, Jon W. Mark, and Xuemin Shen, University of Waterloo

Session 12 - Voice/Video Traffic Modelling

Chair: Erol Gelenbe

- **Aggregation of Markovian Sources: Approximations with Error Control**
Marco Conti, Silvia Ghezzi, and Enrico Gregori, Institute of Italian National Research Council
- **Multi-Scaling Models of Sub-Frame VBR Video Traffic**
Iraj Saniee, Bell Laboratories, Arnold Neidhardt, Telcordia, Onuttom Narayan, University of California, Santa Cruz, and Ashok Erramilli, Qnetworx
- **An Accurate Closed-Form Formula to Calculate the Dejittering Delay in Packetised Voice Transport**
D. De Vleeschauwer and G.H. Petit, Alcatel Bell, B. Steyaert, S. Wittevrongel and H. Bruneel, University of Ghent

10:30-11:00 am

Coffee break

11:00-12:30 am

Session 13 - IP and ATM Interworking

Chair: Paul Kuehn

- **Interworking of B-ISDN Signaling and Internet Protocol**
Muneyoshi Suzuki, NTT

- **Mapping an Internet Assured Service on the GFR ATM Service**
Fernando Cerdan and Olga Casals, Polytecnic University of Catalonia
- **Real-time Cell Arrival Sequence Estimation and Simulator for IP/ATM Networks**
H. Saito and T. Tsuchiya, NTT, G. Marosi, G. Horvath and P. Tatai, Technical University of Boudapest, S. Asano, NACISIS

Session 14 - Single-Server Queues

Chair: Chris Blondia

- **Computing Stochastic Bounds and Tail Distribution of an M/GI/1 Queue**
Pierre Douillet and André-Luc Beylot, Université de Versailles, Monique Becker, Institut National des Télécommunications
- **Analysis of Packet Delay in a GI-G-1 Queue with Non-Preemptive Priority Scheduling**
Joris Walraevens, Bart Steyaert and Herwig Bruneel, University of Ghent
- **New Results on the Numerical Stability of the Stochastic Fluid Flow Model Analysis**
Markus Fiedler, University of Karlskrona/Ronneby and Holger Voos, University of Kaiserslautern

Session 15 - Real-Time Traffic Management

Chair: Bijan Jabbari

- **QoS Support for Real-Time Applications Using the Integration of RSVP/Intserv and Diffserv: A Testbed Experiment**
Seong-Ho Jeong, Myung Choi, Randal Abler, Henry Owen, and John Copeland, Georgia Institute of Technology, Joachim Sokol, Siemens

- **Efficient End-to-End Transport of Soft Real-Time Applications**
Zoe Antoniou, Nokia Research Centre, and Ioannis Stavrakakis, University of Athens
- **Real-Time Traffic Transmission over the Internet**
Marco Furini, University of Bologna, and Don Towsley, University of Massachusetts

12:30-2:00

Lunch

2:00-3:00

Chair: Harry Perros

Invited talk: MPLS and the New Internet Architecture

André Danthine, University of Liege, Belgium



André DANTHINE Professor at the University of Liège since 1967, created a Research Unit in Networking (RUN) in 1972 which, since 1983, has been participating in the European Research Programs.

He is the editor of several

books and proceedings and the author of more than a hundred papers. Chairman of the TC6 of IFIP from 1979 to 1985, he has been Governor of ICCO since 1982. CRB Fellow in 1960, he received the Melchior Salier Prize in 1961, the «Bell Telephone-100th Anniversary» prize in 1983 and the IFIP Silver Core in 1986. In 1993-1994, he was Francqui Professor at the VUB. He is Doctor of Science Honoris Causa of the University of Kent (1991), and of the University Paul Sabatier in Toulouse (1996). Since October 1997, he has been Professor Emeritus at the University of Liege.



3:15-4:45 pm

Session 16 - High Speed Wireless Access

Chair: Ioannis Stavrakakis

- **High Speed Wireless Internet Access: Combination of MPLS and BRAN HIPER-LAN/2 Technologies**
K. Nitsos, INTRACOM and University of Kent at Canterbury, T. Dagiuklas, INTRACOM, and H. Al-Raweshidy, University of Kent at Canterbury
- **Effect of Turn-Around Times on the Performance of High Speed Ad-hoc MAC Protocols**
Ajay Chandra, V. Gummalla, and John O. Limb, Georgia Institute of Technology
- **Experimental Investigation of the Effects of Delay and Error Rate on Throughput and Performance of ATM Satellite Links Serving LAN Islands**
Sufian Yousef, Anglia Polytechnic University, and Claire Moss, Marconi Research Centre

Session 17 - Differentiated Services

Chair: Farouk Kamoun

- **Dynamic Algorithms with Worst-Case Performance for Packet Classification**
Pankaj Gupta and Nick McKeown, Stanford University

- **Intelligent Traffic Conditioners for Assured Forwarding Based Differentiated Services Networks**
B. Nandy, N. Seddigh, P. Piedad, and J. Ethridge, Nortel Networks

- **DiffServ in the Web: Different Approaches for Enabling Better Services in the World Wide Web**
Hartmut Ritter, Thorsten Pastoors and Klaus Wehrle, University of Karlsruhe

Session 18 - Internet Performance and Control

Chair: Catherine Rosenberg

- **Performance of Short TCP Transfers**
Chadi Barakat and Eitan Altman, INRIA Sophia Antipolis
- **Performance Study of Satellite-linked Web Caches and Filtering Policies**
Xiao-Yu Hu, Pablo Rodriguez, and Ernst W. Biersack, EURECOM
- **Distributed Control System for Low Priority Controllable Traffic in Packet Switched Backbone Networks**
Kimmo Pulakka and Jarmo Harju, Tampere University of Technology,

4:45-5:15 pm

Coffee break

5:15-6:15 pm

Session 19 - Residential Access Networks

Chair: Nicolas Georganas

- **Application-Independent End-to-End Security in Shared-Link Access Networks**
José Brustoloni and Juan Garay, Bell Laboratories
- **Fair Efficient Call Admission Control Policies for Heterogeneous Traffic Streams in a Packet Routing Server Using the DTM Technology**
Chih-Jen Chang, Motorola, and Arne A. Nilsson, North Carolina State University

Session 20 - QoS Negotiation

Chair: Zoe Antoniou

- **An Agent-Based Framework for Large Scale Internet Applications**
Mamadou Tadiou Kone and Tatsuo Nakajima, Japan Advanced Institute of Science and Technology
- **Benchmarking of Signaling Based Resource Reservation in the Internet**
István Cselényi, Telia Research, Gábor Fehér and Krisztián Németh, Technical University of Budapest

Session 21 - Resource Management

Chair: Prosper Chemouil

- **Kalman and Neural Network Approaches for the Control of a VP Bandwidth in an ATM Network**
Raphaël Feraud, Fabrice Clérot, Jean-Louis Simon, Daniel Pallou, Cyril Labbe, and Serge Martin, FTR&D
- **Fairness and Aggregation: A Primal Decomposition Study**
A. Girard, INRS, C. Rosenberg, Purdue University, and M. Khemiri, Ecole Polytechnique



Mini-conferences

Second International Workshop on Mobile and Wireless Communications Networks (MWCN 2000)

9:00-10:00 am

• **Keynote Speech II: Future Direction in Home Networking**
Kaveh Pahlavan, Worcester Polytechnic Institute, USA

10:30-11:00 am

Coffee Break

11:00-12:30 am

Session 4 - Mobility management

Chair: Mahmoud Naghshineh, IBM Thomas J. Watson Research Center, USA

• **Efficient Network Utilization for Multimedia Wireless Networks**
Xin Liu, Edwin K. P. Chong and Ness B. Shroff, Purdue University, USA

• **Mobility Management and Roaming with Mobile Agents**
Do Van Thanh, Ericsson, Sverre Steensen, University of OsloUnik and Jan A. Audestad, Telenor AS, Norway

• **Traffic Characteristics in Adaptive Prioritized - Handoff Control Method Considering Reattempt Calls**
Noriteru Shinagawa and Takehiko Kobayashi, YRP mobile Telecom Key tech Lab, Japan, Keisuke Nakano and Masakazu Sengoku, Niigata University, Japan

12:30-2:00 pm

Lunch

2:00-3:30 pm

Session 5 - Mobility Support in IP

Chair: Kaveh Pahlavan, Worcester Polytechnic Institute, USA

• **Threshold - Based Registration in Mobile IPv6**
Linfeng Yang, Jouni Karvo, Teemu Tynjala and Hannu Kari, Helsinki University of Technology, Finland

• **Enhanced Mobile IP Protocol**
B. Essmat, M.N. Mikhail, and A. El Kadi, The American University in Cairo, Egypt

• **A reliable Sub-casting protocol for Wireless Environments**
Djamel Sadok, Carlos de M. Cordeiro and Judith Kelner, Universidade Federal de Pernambuco, Brazil

3:45-6:15 pm

Session 6 - Protocol Inter-working Issues in Satellite and Hybrid Networks

Chair: Marie-Jose Montpetit, Teledesic LLC, USA

• **IP over DVB Standardization Work at ETSI**
Harald Skinnemoen, NERA Technologies, Norway

• **Satellite and Wireless Protocol Work at IETF**
Aaron Falk, Panamsat, Marie-Jose Montpetit, Teledesic LLC, USA

4:45-5:15 pm

Coffee Break

5:15-6:15 pm

• **LMDS and Satellite Inter-working**
Otto Koudelka, Kansas University, USA

• **Multicast and Datacast Protocols over Satellite**
Clausen & al, University of Salzburg, Austria

Programmable and Active Networks Seminar

8.55-9:00 am

Welcome

9:00-10:00 am

Chair: Andrew T. Campbell, Columbia University, USA

Keynote Address

• **Open Network Programmability: Business Considerations**
Ian Leslie, Cambridge University, UK

10:00-10:30 am

Coffee

10:30-12:00 am

Featured Talks

Chair: Ian Wakeman, Sussex University, UK

• **The Design Space for Active Networking**
Jonathan Smith, University of Pennsylvania, USA

• **Toward an Active Internet**
Ken Calvert, University of Kentucky, USA

12:00-1:30 pm

Lunch

1:30-3.30 pm

Programmable IP Networks

Chair: Raouf Boutaba, University of Waterloo, Canada

• **Darwin**

Peter Steenkiste, Carnegie Mellon University, USA

• **Pronto - A Practical Approach to Programmable Routers**
Gisli Hjalmtysson, AT&T Labs, USA

• **Programming Languages for Active Networks**
Ian Wakeman, Sussex University, UK

• **Active Network Research at the Canadian Institute of Telecommunications Research**
Johnny Wong, University of Waterloo, Canada

3:30-4:00 pm

Coffee

4.00-5.30 pm

Active Management

Chair: Rolf Stadler, Columbia University, USA

• **Active Networks for Network Management: Practice and Theory**
Danny Raz and Yuval Shavitt, Bell-Labs, Lucent Technologies, USA

• **Distributed Management with Mobile Components**
Metin Feridun, IBM Research, Switzerland

• **A Middleware Architecture for Active Network Management**
Ryutaro Kawamura, NTT, Japan

5.30 pm

Closing Remarks



Networking 2000

9:00-10:30 am

Session 22 - QoS in Wireless Networks

Chair: Adam Wolisz

- On Learning and the Quality of Service in a Wireless Network

Tiina Heikkinen, Lund University

- Distributed Fair Bandwidth Allocation of a Wireless Base Station

Gyorgy Miklos, Ericsson Traffic Lab, Sandor Molnar, Technical University of Budapest

- Fast Approximate Algorithms for Maximum Lifetime Routing in Wireless Ad-hoc Networks

Jae-Hwan Chang and Leandros Tassiulas, University of Maryland at College Park

Session 23 - Delay Bounds

Chair: Jorma Virtamo

- Performance Evaluation of Resource Division Policies for PGPS Scheduling in ATM Networks

Amr S. Ayad, Khaled Elsayed, and M.T. El-Hadidi, Cairo University

- Worst-Case Deterministic Delay Bounds for Arbitrary Weighted Generalized Processor Sharing Schedulers

Robert Szabo, Peter Barta, Felician Nemeth, and Jozsef Biro, Technical University of Budapest

- Deterministic End-to-End Delay Bounds in an Accumulation Network

Guillaume Urvoy, Gérard Hébuterne, Institut National des Télécommunications, and Yves Dallery, Ecole Centrale.

Session 24 - Internet Protocols

Chair: Patrick Cocquet

- Invited paper: Interoperability in IP Backbones

Vijay Srinivasan, Ericsson

- Performance Analysis of IP and Tag Switching

Gargi Banerjee, Rob Rosenberry, and Deepinder Sidhu, University of Maryland Baltimore County

- A Distributed Mechanism for Identification and Discrimination of Non-TCP-Friendly Flows in the Internet

Thomas Ziegler and Serge Fdida, University Pierre et Marie Curie

10:30-11:00 am

Coffee break

11:00-12:30 am

Session 25 - Wireless LAN

Chair: Guy Omidyar

- New Handoff Strategies in Microcell/Macrocell Overlaying Systems

Selma Boumerdassi and André-Luc Beylot, Université de Versailles

- Dynamic IEEE 802.11: Design, Modeling and Performance Evaluation.

Federico Cali, Marco Conti, and Enrico Gregori, Institute of Italian National Research Council

- TCP/IP over the Bluetooth Wireless Ad-hoc Network

Niklas Johansson, Maria Kihl, and Ulf Körner, Lund University

Session 26 - Traffic Control for Quality of Service

Chair: Lorne Masson

- A Scheme for Time-Dependent Resource Reservation in QoS-Enabled IP Networks

Roberto Canonico, Simon Pietro Romano, Mauro Sellitto and Giorgio Ventre, Università di Napoli «Federico II»

- Server-Based Scheduling for Media Synchronization in an Internet Environment

Zafar Ali, Nortel Networks, Shahab Baqai and Arif Ghafoor, Purdue University

- Impact of «Trunk Reservation» on Elastic Flow Routing

Sara Oueslati-Boulahia and James W. Roberts, FTR&D

Session 27 - Routing

Chair: Keith Ross

- New Distributed Multicast Routing and its Performance Evaluation

Takuya Asaka, NTT Service Integration Laboratories, Takumi Miyoshi, and Yoshiaki Tanaka, Waseda University

- Distance-Vector QoS-Based Routing with Three Metrics

Luis Henrique Maciel Kosmowski Costa, Université Pierre et Marie Curie and Universidade Federal do Rio de Janeiro, Serge Fdida, Université Pierre et Marie Curie and Otto Carlos M. B. Duarte, Universidade Federal do Rio de Janeiro

- On Shortest Path Problems with «non-Markovian» Link Contribution to Path Lengths

Arunabha Sen and K. Selcuk Candan, Arizona State University, Afonso Ferreria, Bruno Beauquier, and Stephane Perennes, CNRS-INRIA-UNSA

12:30-2:00 am

Lunch

2:00-3:00 am

Chair: Miklos Boda

Invited talk: Internet Telephony, the Challenges of Convergence

Christian Huitema, Microsoft



Christian Huitema recently joined Microsoft, as architect for Windows Networking & Communications. Until January 2000, he was chief scientist in the Internet Architecture Research laboratory of Telcordia, where his

work on Internet Telephony led to the development of the «Call Agent Architecture». He joined Bellcore (now Telcordia) the 18 March 1996. From 1986 to 1996, he led the research project RODEO at INRIA in Sophia-Antipolis, France, working on the definition and the experimentation of innovative communication protocols, software and compilers.

Christian Huitema was a member of the Internet Architecture Board (IAB) from 1991 to 1996, its chair between April 1993 and July 1995. He was elected a trustee of the Internet Society in May 1995. He is the author of several publications, and three books, «Routing in the Internet», «IPv6, the new Internet Protocol», and «Et Dieu créa l'Internet».



3:15-4:45 pm

Session 28 - Quality of Service for Video and Multimedia

Chair: Konosuke Kawashima

- **Adaptive QoS Platform in Multimedia Networks**
M. R. Sherif and I. W. Habib, City College of New York, M. Naghshineh and P. Kermani, IBM Research Division
- **Quality-of-Service (QoS) in Heterogeneous Networks: CLIP, LANE and MPOA Performance Test**
Kai-Oliver Detken, Optinet
- **Experiments with Dynamic Multiplexing and UPC Renegotiation for Video over ATM**
Maria Teresa Andrade and A.P. Alves, INESC Porto

Session 29 - Call Admission Control in Cellular Systems

Chair: Samir Thomé

- **The Study of Burst Admission of Data Call in an Integrated Voice/Data CDMA Cellular System**
Jie Zhou, Yoshikuni Onozato, and Ushio Yamamoto, Gunma University
- **Model and Optimal Call Admission Policy in Cellular Mobile Networks**
A. Berqia and N. Mikou, Universit& de Bourgogne Dijon
- **Measurement-Based Pre-Assignment Scheme with Connection-level QoS Support for Multiservice Mobile Networks**
Xiaoyuan Luo, Ian Thng, and Shengming Jiang, National University of Singapore

Session 30 - Resource Allocation

Chair: Ramon Puigjaner

- **QoS Rewards and Risks: A Multi-Market Approach to Resource Allocation**
Errin Fulp and Douglas Reeves, North Carolina State University
- **Spare Capacity Planning for Survivable Mesh Networks**
A. Al-Rumaih, D. Tipper, Y. Liu, and B. Norman, University of Pittsburgh
- **A Cooperative Game Theory Approach to Resource Allocation in Wireless ATM Networks**
Chang Xinjie and K.R. Subramanian, Nanyang Technological University

Closing Session: European Commission

Mini-conferences

Resource Allocation for Mobile Networks

9:00 am

Opening Remarks:

S. Tabbane

- **Code Division Multiple Access and third generation mobile networks**
David Haccoun, Ecole Polytech. de Montréal

Scope of the presentation:

Over the last few years, Personal Communications Systems and Cellular Telephone Networks have experienced a very rapid growth and expansion. Among the different multiple access techniques employed, Code Division Multiple Access (CDMA) is receiving a wide acceptance, especially in the development of next generation systems. Following a brief introduction to spread spectrum fundamentals and basic principles of CDMA, the system architecture used in the IS-95 standard for both the forward and reverse channels will be presented. The evolution of IS-95 toward broadband CDMA, and concepts of multimedia CDMA systems will be discussed. Finally advanced topics in CDMA including mobile satellite systems using CDMA will be presented.

10:30-11:00 am

Break

- **Frequency assignment in GSM cellular networks**

Alexandre Caminada, FTR&D

Scope of the presentation:

The frequency assignment in GSM cellular

networks is an optimization problem where the subject is to assign spectrum resources to wireless communication links. The large size of current real networks in Europe (over 3,000 cells in large urban cities), traffic demand still increasing and spectrum restriction involve a high rate of frequency reuse. It supplies the most severe constraints of the problem, which are electromagnetic interference constraints between links. The presentation will examine the challenges of frequency planning, the parameters involved in frequency planning, the implication of automatic frequency planning tools on frequency optimization and a comparison of some effective solutions.

12:30-2:00 pm

Lunch

- **Medium Access Protocols in mobile radio networks**
Christos Douligeris, University of Piraeus

Scope of the presentation:

This talk will focus on resource allocation techniques for wireless networks. In particular, we will cover traditional and state-of-the-art models covering multiple access schemes (e.g. random access, fixed access, demand assignment schemes) and channel allocation schemes (e.g. fixed channel allocation and dynamic channel allocation schemes).

These methodologies will be compared to each other and evaluated for a variety of criteria, including complexity, efficiency, scalability and compatibility. The salient features of wireless networks versus wired networks that make the use of these techniques acceptable will also be discussed.



3:30-4:00 pm

Break

- Resource allocation in multimedia radio networks

Djamal Zeglache, Institut National des Télécommunications

Scope of the presentation:

General issues and challenges facing resource allocation for multimedia mobile networks will be presented in the context of both TDMA and CDMA based systems. The problem remains in essence a general traffic theory problem for TDMA based systems and will be first viewed as such. Several approaches and service handling policies will be addressed. Particular attention will be given to HSCSD and GPRS services. The problem will be extended to power management and interference issues when discussing CDMA systems. In particular, the UTRA FDD mode will be analyzed in the multimedia service offer context.

5:30 pm

End of the mini-conference.

Control and Network Software in Internet

A meeting will be held on control and network software in Internet. This meeting will be chair by Bijan Jabbari (Georges Mason University)

The wide spread use of Internet and its promise in catering to a variety of services provides a unique opportunity to focus on and to contribute to signalling, control, and network software. This special session provides an opportunity for informal but cutting edge presentations in this important area. We invite your participation in this session where guest speakers will discuss present research and future directions in the control architecture for next generation networks and services.

Mini-conferences

Broadband Satellite Networking

9:00-9:45 am

- Introduction

Catherine Rosenberg, Purdue University, USA

- Keynote Speech I: Satellite communications : perspectives and challenges

Gerard Maral, ENST, Toulouse, France.

9:45-10:45 am

Multicast

Chair: Erina Ferro, CNR, Italy.

- Hybrid Access and Multicasting

Anthony Ephremides, University of Maryland, USA.

- TBD

Denis Rouffet, Skybridge, France.

- Web-oriented Multimedia Services via direct Broadcast Satellites

Horst Clausen, University of Salzburg, Austria.

10:45-11:00 am

Coffee Break

11:00-12:30 pm

Systems and Interoperability

Chair: Barry Evans, Surrey University, UK.

- Interoperability issues in satellite networking from an IP perspective

Marie-Jose Monpetit, Teledesic Inc., USA.

- Multimedia via Satellite - the European Initiatives

Manfred WittingI, European Space Agency, Netherland.

- Cisco's satellite solutions

Robert Ordemann, CISCO, USA.

- Benefits of standardization for broadband satellite networks : The DVB-RCS case

Eric Alberty, ASTRIUM, MMS, France.

12:30-1:30 pm

Lunch

1:30-2:10 pm

Keynote Speech II: Evolution of IP services over satellite

Doug Dillon, Hughes Network Systems (DirectPc).

2:15-3:15 pm

From TCP to MPLS

- European Standardization Activities on Broadband Satellite Networks

Harald Skinnemoen, NERA SatCom, Norway.

- TCP Peach: A Transport Layer Protocol for Satellite IP Networks

Giacomo Morabito, Ian F. Akyildiz, Georgia Institute of Technology and Sergio Palazzo, University of Catania, Catania, Italy.

- MPLS over next generation satellite networks

Catherine Rosenberg, Purdue University, USA and Tolga Ors, Nortel Networks, UK.

- Traffic Management Issues for Broadband Satellite Networks

Sastri Kota, Lockheed Martin, USA.

3:45-4:00 am

Coffee Break



(Broadband Satellite Networking continued)

4:00-5:00 pm

Routing

- Dynamic routing over unidirectional satellite links.

Walid Dabbous, INRIA, France.

- Performance Evaluation of Adaptive Routing Algorithms in ISL Networks

Mihael Mohorcic, Ales Svigelj, Gorazd Kandus, Institute Jozef Stefan, Slovenia and Markus Werner, DLR - German Aerospace Center.

- Link State Routing in a LEO Satellite Network

Behcet Sarikaya and Masaru Tasaki, University of Aizu, Japan.

Quality of Service and Multimedia Applications

9:00-12:30 am

Opening remarks:

Eric Horlait

Invited speakers:

- End to end congestion control and avoidance for multiple source applications

Jon Crowcroft, UCL, United Kingdom

- Consistency QoS

Ralf Steinmetz, University of Darmstadt, Germany

- MPLS and its applications to traffic engineering

Vijay Srinivasan, Ericsson IP, USA

Multimedia Management

8:55 am

Opening:

José Neuman de Souza, Federal University of Ceará, and Nazim Agoulmine, LIP6, France

9:00-10:30 am

- Collaborative Virtual Environments: Managing the Shared Spaces

Nicolas D. Georganas, University of Ottawa

- Integrating Management Systems to support Advanced Multimedia based telecommunications Services

William Donnelly, Waterford Institute of Technology

10:30-11:00 am

Coffee Break

11:00-12:30 am

- The Role of Group Communication in Supporting Efficient Event Correlation

Ehab Al-Shaer, DePaul University

- Service Velocity

Andrew T. Campbell, Columbia University

12:30-2:00 pm

Lunch

2:00-3:30 pm

- QoS Management for Multimedia Applications Using an Efficient Queue Policy

Seong-Ho Jeong, Georgia Institute of Technology

- Ponder: A Language for Specifying Security and Management Policy for Distributed Systems

Emil C. Lupu, Imperial College

3:30-4:00 pm

Coffee Break

4:00-5:30 pm

- An Agent-based Framework for Large Scale Internet Applications

Mamadou Tadiou Kone, Japan Advanced Institute Of Science And Technology

- On Video Server Management

Nelson L. S. da Fonseca, State University of Campinas

5:30-5:40 pm

Coffee break

5:40-7:00 pm

- Dynamic Network Adaptation Techniques for Improving Service Quality

Alan Marshall, The Queen's University of Belfast, Northern Ireland

- Intelligent Agent Architecture as A flexible Solution for Multimedia System and Network Control

Nazim Agoulmine, LIP6

Next Generation Networks Session

European Commission

Objectives of the Session:

- 1 - To present the EU activities in the field and review project results
- 2 - To discuss priorities for future R&D in the field

8:55 am

Opening

9:00-10:30 am

EU Activities

- Next Generation Networks in the IST Projects

Horst Forster

- Review of IST Projects Activities

Paulo de Sousa

- e-Europe and the Portuguese Presidency

Augusto Casaca

- e-Europe and the French Presidency

Remy Bayou

10:30-11:00 am

Coffee Break

11:00-13:00 am

Future Priorities for R&D

Chair: Helmut Leopold

(open to the audience; solicited and unsolicited)

- Next Generation IP

Berbard sales

- Premium IP services

Robert Phillips

- Active Networks

Arturo Azcorra

- Wireless IP and IPv6

Nokia

- IP over WDM implementations

Canarie/BT

- Next Generation Networks in Japan

Fumino Kubota

- Cost Projects

Olivier Bonaventure

- Eurescom projects

Peter Stollenmeyer



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Special Program Chair PCN track

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Raouf Boutaba - Canada

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Jouni Mikkonen - Finland

Debasis Mitra - USA

Arne Nilsson - USA

Raif Onvural - USA

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Jorma Virtamo - Finland

Adam Wolisz - Germany



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and Boulevard Macdonald

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