

Lecture Notes in Computer Science

1185

Edited by G. Goos, J. Hartmanis and J. van Leeuwen

Advisory Board: W. Brauer D. Gries J. Stoer

G. Ventre J. Domingo-Pascual
A. Danthine (Eds.)

Multimedia Telecommunications and Applications

Third International COST 237 Workshop
Barcelona, Spain, November 25-27, 1996
Proceedings



Springer

Series Editors

Gerhard Goos, Karlsruhe University, Germany

Juris Hartmanis, Cornell University, NY, USA

Jan van Leeuwen, Utrecht University, The Netherlands

Volume Editors

Giorgio Ventre

Università di Napoli Federico II, Dipartimento di Informatica e Sistemistica
Via Claudio 21, I-80125 Napoli, Italy

E-mail: ventre@nadis.dis.unina.it

Jordi Domingo-Pascual

Universitat Politècnica de Catalunya

Departament d'Arquitectura de Computadors

Campus Nord - Mòdul D6, c. Gran Capità sn, 08071 Barcelona, Spain

E-mail: jordid@ac.upc.es

André Danthine

Université de Liège, Institut Montefiore, B28

B-4000 Liège, Belgium

E-mail: danthine@ulg.ac.be

Cataloging-in-Publication data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Multimedia telecommunications and applications : proceedings
/ Third International COST 237 Workshop, Barcelona ; Spain,
November 25 - 27, 1996. G. Ventre ... (ed.). - Berlin ;
Heidelberg ; New York ; Barcelona ; Budapest ; Hong Kong ;
London ; Milan ; Paris ; Santa Clara ; Singapore ; Tokyo :
Springer, 1996

(Lecture notes in computer science ; Vol. 1185)

ISBN 3-540-62096-6

NE: Ventre, Giorgio [Hrsg.]; International COST 237 Workshop <3,
1996, Barcelona>; GT

CR Subject Classification (1991): H.4.3, C.2, I.7.2, B.4.1, H.5.1, H.5.3

ISSN 0302-9743

ISBN 3-540-62096-6 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

© Springer-Verlag Berlin Heidelberg 1996

Printed in Germany

Typesetting: Camera-ready by author

SPIN 10549967 06/3142 - 5 4 3 2 1 0 Printed on acid-free paper

Third COST 237 Workshop
Multimedia Telecommunications and Applications
Barcelona, November 25-27, 1996

Preface

During the last few years we have witnessed an impressive increase in the interest in multimedia communications and applications. After an initial research phase, pilot projects fostered by national and international research programs are now being launched all over Europe and the world involving not only a limited audience of specialists, but literally bringing multimedia to the home. Consequently, the issues related to the provision of advanced multimedia services are increasingly of interest. In parallel, the need for a timely definition of standards for the design and the deployment of new technologies in this area is encouraging the creation of consortia where manufacturers, telecommunication operators and researchers can exchange ideas and experiences so that products and services may be developed more rapidly.

Since its beginning in February 1992 as an new Action in the CEC COST Program, COST 237 aimed to be a forum for a continuous and effective exchange of ideas and experiences among academia, industry and telecom operators. Since then 14 countries from the European Union and from the rest of Europe have joined the Action with more than 30 institutions directly involved in the activities. COST 237 can be considered as a network of researchers that regularly have the opportunity to exchange the research results and experiences they have developed in the framework of their own national and international scientific cooperation. Most of this exchange is accomplished through the activities of Working Groups. Originally, two groups were created on Multimedia Teleservices (WG 1) and New Transport Services Specifications (WG 2); during the last year one new Working Group has been activated in the critical area of Security and Applications (WG 4) and one more on Communication Support for Multimedia Applications (WG 3) has replaced WG 2, closed on completion of the defined tasks. While the Working Group on Security and Applications is focused on the issues of user authentication, service securing and authentication, copyright protection, and interoperability of certifications authorities, the Working Group on Communication Support for Multimedia Applications is aimed at the study of the problems related to protocols and mechanisms for enhanced transport services, multipeer communications, resource management and Quality of Service assurance, distributed signalling and control, and heterogeneity of network architectures. Another activity worth mentioning pursued by COST 237 during the last year is surely the organisation of common events and initiatives, like the first ECMAST conference in Louvain la Neuve, with other European research frameworks such as the ACTS Program.

The 1996 COST 237 International Workshop on Multimedia Telecommunications and Applications was planned by the Management Committee of the Action with the aim of emphasising such changes in the Action structure and of further encouraging interactions of its members with other research groups active in all the areas of interest. This workshop is the third of a series of successful events held formerly in Vienna (1994) and in Copenhagen (1995) that have attracted the attention of a quite large number of researchers in the field of distributed multimedia. Protocols and mechanisms for cooperative multimedia applications are currently a prime focus for many standardisation and institutional bodies. Among these are the ATM Forum, the IETF, DAVIC, TINA, ITU, and ISO. A major goal of this third workshop was to present the latest research developments that may be of interest to these various bodies and to encourage an exchange of experiences. For these reasons, in contrast to the approach followed for the 1995 Workshop, this year an open Call for Papers was issued, that produced a total of 34 papers submitted from Europe and USA. After a very selective refereeing process, less than 50% papers of high quality were accepted for a total of 15 presentations, to achieve the goal of a compact and very interesting workshop program. We are sorry that many other interesting papers had to be rejected due to the lack of space but we hope that this selection effort will be appreciated by both the authors and the attendees.

Five technical sessions have been scheduled. The first session, on Multipeer and Group Communication, includes papers presenting an innovative routing algorithm with delay constraints, a group management system for multimedia applications, and a mechanism to improve scalability in transport level multicasting techniques. The second session is totally devoted to Quality of Service control and assurance issues. The first paper introduces a platform for service creation and renegotiation; the second paper is related to the problems of specifying QoS requirements in standard distributed programming environments; the third paper, finally, presents a scheme for the conversion of communication media to be used in mobile network platforms. The third session on Applications and Teleservices includes three experiences on the development of new applications and services: a presentation on a hypermedia system for the deployment of new services, a paper on an innovative CSCW application for the large scale distribution of conferences, and a paper on a pilot interactive application. The fourth session on Multimedia Protocols and Platforms includes a paper on the design issues for a new network protocol, a coding scheme suited for mobile multimedia communication, and a presentation on the development of a multimedia conferencing application using a signalling platform. The fifth and final session is devoted to Performance issues. The first paper included presents an innovative approach to the design of a network and adaptation layers for ATM networks. The second paper deals with the capability of a Unix SVR4 kernel to host multimedia applications. The third paper presents a technique for the evaluation of the impact of optimisation techniques on the transmission of MPEG-2 video streams.

The Third COST 237 International Workshop on Multimedia Telecommunications and Applications is organised by the CEC COST 237 Action on Multimedia Telecommunications Services and this year is hosted in the wonderful city of Barcelona by the Universitat Politècnica de Catalunya with the support of Telefónica de España and

the Comissionat per a Universitats i Recerca (Generalitat de Catalunya). A number of people have to be acknowledged for the preparation and organisation of this event. First of all, André Danthine and David Hutchison for their effort in leading this Action along these years on a path that can surely be said to be very successful. I also wish to thank the members of the Steering Committee for the planning of the event, and the members of the Program Committee for their effort in inviting, refereeing, and selecting the papers with the invaluable help of all the reviewers who supported us. A sincere acknowledgement goes also to all the authors who submitted their research work to our workshop. Finally, I would like to express my deep appreciation to the Organising Committee and particularly to Jordi Domingo-Pascual for taking on the critical task of making such an event possible. To all the participants and presenters I am glad to send my best wishes for an enjoyable and fruitful workshop.

October 1996

Giorgio Ventre

Program Committee

Giorgio Ventre	<i>U. di Napoli "Federico II", Italy (Chair)</i>
Patrick Baker	<i>HP Labs, UK</i>
Torsten Braun	<i>IBM ENC, Germany</i>
Augusto Casaca	<i>INESC, Portugal</i>
Geoff Coulson	<i>Lancaster U., UK</i>
Jon Crowcroft	<i>UCL, UK</i>
André Danthine	<i>U. of Liège, Belgium</i>
Michel Diaz	<i>LAAS/CNRS, France</i>
Christophe Diot	<i>INRIA, France</i>
Wolfgang Effelsberg	<i>U. of Mannheim, Germany</i>
Serge Fdida	<i>MASI, France</i>
Domenico Ferrari	<i>U. Cattolica à Piacenza, Italy</i>
David Hutchison	<i>Lancaster U., UK</i>
Villy B. Iversen	<i>Technical U. of Denmark, Denmark</i>
Marjory Johnson	<i>RIACS, USA</i>
Helmut Leopold	<i>Alcatel, Austria</i>
Benoit Macq	<i>U. Catholique de Louvain, Belgium</i>
Jordi Domingo-Pascual	<i>U. Politècnica de Catalunya, Spain</i>
Ramon Puigjaner	<i>U. de les Illes Balears, Spain</i>
Radu Popescu-Zeletin	<i>GMD-Fokus, Germany</i>
Aruna Seneviratne	<i>UTS, Australia</i>
Otto Spaniol	<i>T.U. Aachen, Germany</i>
Jean-Bernard Stefani	<i>CNET, Paris, France</i>
Ralf Steinmetz	<i>T.U. Darmstadt, Germany</i>
Harmen van As	<i>Vienna Institute of Technology, Austria</i>
Martina Zitterbart	<i>T.U. Braunschweig, Germany</i>

Steering Committee

André Danthine	<i>U. of Liège, Belgium (Chair)</i>
Theodoros Bozios	<i>Intracom, Greece</i>
Christophe Diot	<i>INRIA, France</i>
Jordi Domingo-Pascual	<i>U. Politècnica de Catalunya, Spain</i>
Wolfgang Effelsberg	<i>U. of Mannheim, Germany</i>
Serge Fdida	<i>MASI, France</i>
Domenico Ferrari	<i>U. Cattolica à Piacenza, Italy</i>
José Guimaraes	<i>ADETTI, Portugal</i>
David Hutchison	<i>Lancaster U., UK</i>
Villy Iversen	<i>Technical U. of Denmark, Denmark</i>
Borka Jerman-Blazic	<i>Institute Jozef Stefan, Slovenia</i>
Helmut Leopold	<i>Alcatel, Austria</i>
Vassili Loumos	<i>NTUA, Greece</i>
Radu Popescu-Zeletin	<i>GMD-Fokus, Germany</i>
Sandor Stefler	<i>PKI, Hungary</i>
Giorgio Ventre	<i>U. of Napoli, Italy</i>

Organizing Committee

Jordi Domingo-Pascual	<i>U. Politècnica de Catalunya, Spain</i>
Josep Solé-Pareta	<i>U. Politècnica de Catalunya, Spain</i>
Xavier Martínez-Álvarez	<i>U. Politècnica de Catalunya, Spain</i>
Joan Vila-Sallent	<i>U. Politècnica de Catalunya, Spain</i>
Ciaran O'Colmain	<i>Norcontel, Ireland</i>

This workshop is organized with the collaboration of the CEC COST Action on Multimedia Telecommunications Services, the Universitat Politècnica de Catalunya (UPC), Telefónica de España and the Comissionat per a Universitats i Recerca (Autonomous Government of Catalonia).

The edition of these proceedings has been possible thanks to:



Contents

Session A: Multipeer and Group Communication

Chair: Serge Fdida, Laboratoire MASI, France

A Group and Session Management System for Distributed Multimedia Applications	1
---	---

*E. Wilde, P. Freiburghaus, D. Koller, B. Plattner,
Swiss Federal Institute of Technology, Switzerland*

Low-Cost ATM Multicast Routing with Constrained Delays	23
--	----

A. G. Waters, J. S. Crawford, University of Kent at Canterbury, UK

Adding Scalability to Transport Level Multicast	41
---	----

M. Hofmann, University of Karlsruhe, Germany

Session B: Quality of Service

Chair: André Danthine, University of Liège, Belgium

On Realizing a Broadband Kernel for Multimedia Networks	56
---	----

M. C. Chan, J.-F. Huard, A. A. Lazar, K.-S. Lim, Columbia University, USA

Specifying QoS for Multimedia Communications within Distributed Programming Environments	75
--	----

D. G. Waddington, G. Coulson, D. Hutchison, Lancaster University, UK

Generic Conversion of Communication Media for Supporting Personal Mobility	104
--	-----

T. Pfeifer, R. Popescu-Zeletin, Technical University of Berlin, Germany

Session C: Applications and Teleservices

Chair: Geoff Coulson, Lancaster University, UK

A Framework for the Deployment of New Services Using Hypermedia Distributed Systems	130
---	-----

Á. Almeida, INESC, Portugal

ISABEL: A CSCW Application for the Distribution of Events	137
---	-----

*J. Quemada, T. de Miguel, A. Azcorra, S. Pavon, J. Salvachua, M. Petit,
D. Larrabeiti, T. Robles, G. Huecas, Universidad Politécnica de Madrid, Spain*

The Bookshop Project: An Austrian Interactive Multimedia Application Case Study	154
---	-----

H. Leopold, R. Hirn, Alcatel Austria AG, Austria

Session D: Multimedia Protocols and Platforms

Chair: Helmut Leopold, Alcatel Austria AG, Austria

Issues in the Design of a New Network Protocol 169

*M. Degermark, Luleå University,**S. Pink, Luleå University and Swedish Institute of Computer Science, Sweden*

Source and Channel Coding for Mobile Multimedia Communications 183

A. H. Sadka, F. Eryurtlu, A. M. Kondoz, University of Surrey, UK

Developing a Conference Application on Top of an Advanced Signalling Infrastructure 201

*R. J. Huis in't Veld, Philips Multimedia Bussines Networks,**A.-N. Ladhani, B. van der Waaij, I. A. Widya, University of Twente,**F. Moelaert El-Hadidy, J. P. C. Verhoosel, Telematics Research Centre, The Netherlands***Session E: Performance Studies**

Chair: Christophe Diot, INRIA, France

New Network and ATM Adaptation Layers for Real-Time Multimedia Applications: A Performance Study Based on Psychophysics 216

*X. Garcia Adanez, O. Verscheure, J.-P. Hubaux,**Swiss Federal Institute of Technology, Switzerland*

Multimedia Applications on a Unix SVR4 Kernel: Performance Study 232

D. Bourges Waldegg, N. Lagha, J.-P. Le Narzul, Telecom Bretagne, France

Perceptual Video Quality and Activity Metrics: Optimization of Video Services Based on MPEG-2 Encoding 249

*O. Verscheure, J.-P. Hubaux,**Swiss Federal Institute of Technology, Switzerland*

Index of Authors 267