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Traffic and QoS Management in Wireless Multimedia Networks

COST 290 Final Report

 Springer

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Preface

The current book provides a final report of activity performed by the COST 290 Action, “Traffic and QoS Management in Wireless Multimedia Networks,” which ran from March 10, 2004, until June 3, 2008. After an introduction to the COST framework and the Action’s survey time-frame and activities, the main part of the book addresses a number of technical issues, which are structured into several chapters. All those issues have been carefully investigated by the COST 290 community during the course of the project – the information presented in this book can be regarded as ultimate for each particular topic; every open research issue addressed in the book is described carefully, corresponding existing studies are analyzed and results achieved by the COST 290 community are presented and compared, and further research directions are defined and analyzed. Because the book covers a wide area of research addressing issues of modern wired and wireless networking at different layers, starting from the physical layer up to the application layer, it can be recommended to be used by researchers and students to obtain a comprehensive analysis on particular research topics including related areas, to obtain broad and ultimate referencing, and to be advised on current open issues.

COST 290 is one of the Actions of the European COST Program. Founded in 1971, COST is an intergovernmental framework for European Cooperation in the field of Scientific and Technical Research, allowing the coordination of nationally funded research on a European level. COST Actions cover basic and precompetitive research as well as activities of public utility. The goal of COST is to ensure that Europe holds a strong position in the field of scientific and technical research for peaceful purposes by increasing European cooperation and interaction in this field. COST has clearly shown its strength in noncompetitive research, in prenormative cooperation, and in solving environmental and cross-border problems and problems of public utility. It has been successfully used to maximize European synergy and to add value in research cooperation, and it is a useful tool to further European integration, in particular concerning Central and Eastern European countries. Ease of access for institutions from nonmember countries also makes COST a very interesting and successful tool for tackling topics of a truly global nature. To emphasize

that the initiative came from the scientists and technical experts themselves and from those with a direct interest in furthering international collaboration, the founding fathers of COST opted for a flexible and pragmatic approach. COST activities have in the past paved the way for European Community activities, and their flexibility allows COST Actions to be used as a testing and exploratory field for emerging topics. The member countries participate on an “à la carte” principle, and activities are launched with a “bottom-up” approach. One of the main features of COST Actions are their built-in flexibility. This concept clearly meets a growing demand, and, in addition, it complements European Community programs. COST has a geographic scope beyond the European Union, and most of the Central and Eastern European countries are members. COST also welcomes the participation of interested institutions from non-COST member states without any geographic restriction. COST has developed into one of the largest frameworks for research cooperation in Europe and is a valuable mechanism coordinating national research activity in Europe. Detailed and up-to-date information on the COST Program can be obtained on the Web: <http://www.cost.esf.org/>

The COST 290 as a regular Action of the COST Program was maintained by the Management Committee (MC) officially nominated through a legal procedure. The MC was formed by the following national delegates: Ilka Miloucheva (Salzburg Research, Austria), Ulla Birnbacher (Graz University of Technology, Austria), Chris Blondia (University of Antwerp, Belgium), Ingrid Moerman (University of Gent, Belgium), Stoyan Poryazov (Bulgarian Academy of Science, Bulgaria), Seferin Mirtchev (Technical University of Sofia, Bulgaria), Nikola Rožić (University of Split, Croatia), Maja Matijašević (University of Zagreb, Croatia), Andreas Pitsillides (University of Cyprus, Cyprus), Chrysostomos Chrysostomou (University of Cyprus, Cyprus), Jarmo Harju (Tampere University of Technology, Finland), Yevgeni Koucheryavy (Tampere University of Technology, Finland), Pascal Lorenz (University Haute Alsace, France), Daniel Kofman (ENST, France), Phuoc Tran-Gia (University of Würzburg, Germany), Adam Wolisz (Technical University of Berlin, Germany), Vassilis Tsaousidis (Demokritos University of Thrace, Greece), Vasilios A. Siris (ICS-FORTH, Greece), Sean McGrath (University of Limerick, Ireland), Máirtín Ó Droma (University of Limerick, Ireland), Giovanni Giambene (University of Siena, Italy), Saverio Mascolo (Polytechnic University of Bari, Italy), Algimantas Kajackas (Vilnius Technical University, Lithuania), J. L. Van den Berg (TNO ICT/University of Twente, The Netherlands), Remco Litjens (TNO Telecom, The Netherlands), Peder J. Emstad (Q2S, Norwegian University of Science and Technology, Norway), Fernando Velez (University of Beira Interior, Portugal), Edmundo Monteiro (University of Coimbra, Portugal), Tatiana Radulescu (Polytechnical University Bucharest, Romania), Virgil Dobrota (Technical University of Cluj-Napoca, Romania), Martin Klimo (University of Zilina, Slovakia), Dejan Miletic (University of Maribor, Slovenia), Gorazd Kandus (Institute Jozef Stefan, Slovenia), Manuel Alvarez-Campana

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During the course of the Action, 11 Management Committee meetings took place. Every MC meeting was followed by technical meeting where actual research work was presented and discussed.

Every presentation was assigned with an internal number, and if there was a corresponding paper or report available, a technical document (TD) made out of it was delivered to the COST 290 TD database, which is available online beyond the Action's time frame. Because it is the case that TDs contain ongoing work presented for the sake of comments and discussion, they are posted in a password-restricted area accessible to the Action's community only. This book contains a lot of references to TDs; these documents are available at the Action's Web site: <http://www.cost290.org/td.html>

Management Committee meetings were hosted by participating institutions all around the Europe: the kick-off meeting on June 4, 2004, in Brussels, Belgium; the first meeting on October 7–8, 2004, in Gozo, Malta; the second meeting on February 3–4, 2005, in Colmar, France; the third meeting on May 11–13, 2005, in Xanthi, Greece (co-located with WWIC 2005); the fourth meeting on October 13–14, 2005, in Würzburg, Germany; the fifth meeting on February 9–10, 2006, in Delft, The Netherlands; the sixth meeting on May 9–10, 2006 in Bern, Switzerland (co-located with WWIC 2006); the seventh meeting on September 29–30, 2006, in Split, Croatia; the eighth meeting on February 15–16, 2007, in Malaga, Spain; the ninth meeting on May 22–23, 2007, in Coimbra, Portugal (co-located with WWIC 2007); the tenth meeting on October 1–2, 2007, in Vienna, Austria, and finally the eleventh meeting on May 27–28, 2008, in Tampere, Finland (co-located with WWIC 2008).

The meetings that took place during the course of the Action have been attended by more than 150 different participants from more than 70 institutions from 27 countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Lithuania, The Netherlands, Malta, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, Australia, Russia, and the United States.

Every meeting featured outstanding invited speakers from outside the COST 290 community: Ian F. Akyildiz (Georgia Tech., United States); Michael Smirnov (Fraunhofer FOKUS, Germany); Anderi Gurtov (HIIT, Finland); Toon Norp (TNO ICT, The Netherlands); Sonia Fahmy (Purdue University, United States); David Hutchison (Lancaster University, United Kingdom); Thomas Plagemann (University of Oslo, Norway); Petros Belimpasakis (Nokia Research Center, Finland); Nim K. Cheung (IEEE Communications Society, United States);

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At the first MC meeting, the technical agenda for the Action was split into four working groups (WGs) that later formed five chapters of this book; WG1 contributions were split into two chapters due to the significant number of contributions. The structure of the WGs is as follows: WG1, “Traffic Engineering,” chaired by Prof. Dirk Staehle (University of Würzburg, Germany); WG2, “Mobility and Interoperability,” chaired by Prof. Francisco Barcelo-Arroyo (Technical University of Catalonia, Spain); WG3, “Network Architecture and Planning,” chaired by Prof. Torsten Braun (University of Bern, Switzerland); and WG4, “Services, Regulations, and Economic Aspects,” chaired by Prof. Vasilios Siris (ICS-FORTH, Greece). Chapter 1 of this book contains a guide to WG organization, objectives, and achievements; it also provides a deep look into the Action, its motivation, performance, and dissemination results.

A very important and flexible instrument of the COST Program is Short-Term Scientific Mission (STSM). Because the COST 290 community was not developed from any other project or previous Action, it took some time for the participants to get in touch and start working together. During the first operational year, only one STSM was completed; however, going further when some critical level of community integration was achieved, collaboration work speeded up resulting in an increase in the number of STSMs, which finally boosted production of joint TDs and fulfilled the COST Program key objective. It is already clear that the established contacts and channels will go beyond COST 290 and will be later used in various ways, such as joint teaching and research, joint funding applications, editorials, student exchanges, and other ways. Moreover, already during the course of the Action the following joint activities have been performed: joint papers, tutorials, editorials, funding applications, and so forth.

On top of its regular operation presuming collaborative research as the main target, to transfer its know-how to the outside world, the COST 290 launched an open-call workshop – WWIC (Wired/Wireless Internet Communications) – held annually, achieving outstanding quality and low acceptance ratio, publishing its proceedings in the LNCS series by Springer, getting the best professionals to become invited speakers, and attracting worldwide attention under COST technical and financial sponsorship. It is clear that WWIC will remain beyond the COST 290 time frame while keeping a very high standard

established. For the last workshop, the WWIC was supported by COST 290 during year 2008 when it took place in Tampere, Finland, hosted by the Tampere University of Technology on May 28–30 along with the last MC meeting of the COST 290.

This book was initiated in May 2006. After discussion during the sixth MC meeting, it was strategically decided to adopt the Working Groups structure originally developed back at the first meeting in October 2004. It appears that indeed the original WGs structure still is the order of the day, meaning every contribution fits to a particular WG, and originally elected WG chairs volunteer to receive the burden of writing a chapter. During every plenary meeting, the book was actively discussed and commented on by all participants – an editorial team consisting of WG Chairs, Action Chair, and Action Co-Chair did its best to respect and accommodate all comments and proceed in a smooth and optimal way. It took a while to sort all contributions, prepare the table of contents, collect dedicated contributions, and compile every chapter. In January 2008, the editorial team had a great opportunity to hold a meeting where this book was to be finalized. This meeting took place in Berlin, Germany, at T-Systems Media and Broadcast GmbH. There were two really busy days with many technical and editorial issues addressed. Thanks to 4 years of joint work in COST 290, the editorial team managed to achieve great results in a smooth way.

The achievements of the COST 290 Action would not have been possible without the contribution of a hard-working, brilliant team of many contributors. We also take this opportunity to express our gratitude to the reviewers who made a special effort under strict time constraints to review the draft of this book, namely Máirtín Ó Droma (University of Limerick, Ireland), Alexey Vinel (Saint-Petersburg Institute for Informatics and Automation, Russian Academy of Sciences, Russia), Veselin Rakocevic (City University London, United Kingdom), Evgeny Osipov (Luleå University of Technology, Sweden), and Sean McGrath (University of Limerick, Ireland).

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