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# Emerging Management Mechanisms for the Future Internet

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# Preface

The International Conference on Autonomous Infrastructure, Management, and Security (AIMS 2013) is a single-track event integrating regular conference paper sessions, tutorials, keynotes, and a PhD student workshop into a highly interactive event. One of the key goals of AIMS is to look beyond borders and to stimulate the exchange of ideas across different communities and among PhD students.

AIMS 2013 — which took place during June 25–28, 2013, in Barcelona, Spain and was hosted by the Universitat Politècnica de Catalunya — was the seventh edition of a conference series on management and security aspects of distributed and autonomous systems. It followed the already established tradition of an unusually vivid and interactive conference series, after successful events in Luxembourg, Luxembourg in 2012, Nancy, France in 2011, Zürich, Switzerland in 2010, Enschede, The Netherlands in 2009, Bremen, Germany in 2008, and Oslo, Norway in 2007. This year, AIMS 2013 focused on emerging management mechanisms for the Future Internet. This theme is addressed in the technical program with papers related to emerging monitoring, security, and autonomous mechanisms complemented by others focusing on next-generation networks and services, such as, among others, content delivery, information-centric networks, and Internet of Things.

AIMS 2013 was organized as a 4-day program, which proved especially suitable for stimulating the interaction with and the active participation of the conference’s audience. The event started with 1.5 days of 3 courses and labs, which offered hands-on learning experience in network and service management topics and required the attendees to work in practical on-site labs, preceded by short tutorial-style teaching sessions. The first tutorial introduced the context of large-scale measurement platforms, how to write and schedule a measurement test, how to schedule the reporting of measurement results, and how to retrieve results for data analysis. The second tutorial gave an overview of the functionality, the architecture, and the hands-on guide on “The Virtual Wall”, a generic experimental environment for advanced network, distributed software, service evaluation, and scalability research. Finally, the third tutorial revisited basic concepts of virtual distributed test-labs, such as PlanetLab or EMANICSLab, and provided hands-on training on how to use them for research activities.

AIMS 2013 continued with a keynote presentation by Bertrand Mathieu, senior researcher at Orange Labs, France, on management and monitoring challenges in content-centric networking. The 4 subsequent technical sessions — covering traffic engineering and Quality-of-Service, security, autonomous management, and monitoring mechanisms — of AIMS 2013 included 11 full papers, which were selected after a thorough reviewing process out of a total of 32 submissions and where each paper received 3 independent reviews.

The AIMS PhD workshop determines a venue for doctoral students to present and discuss their research ideas as well as, most importantly, to obtain valuable feedback from the AIMS audience about their planned PhD research work. This year, the workshop was structured into two technical sessions covering monitoring and modeling as well as content distribution and multimedia. All PhD papers included in this volume describe the current state of these investigations, including their clear research problem statements, investigation approaches, and an outline of results achieved so far. A total of 7 PhD papers were presented and discussed. These papers were selected after a separate review process out of 14 submissions, while the majority of PhD papers received 3 independent reviews.

The present volume of the *Lecture Notes in Computer Science* series includes all papers presented at AIMS 2013 as defined within the overall final program. It demonstrates again the European scope of this conference series, since most of those papers accepted originate from European research groups.

The editors would like to thank the many people who helped make AIMS 2013 such a high-quality and successful event. Firstly, many thanks are addressed to all authors, who submitted their contributions to AIMS 2013, and to the tutorial and keynote speakers, namely, Vaibhav Bajpai and Nikolay Melnikov, Steven Latré and Jeroen Famaey, David Hausheer and Bertrand Mathieu. The great review work performed by the members of both the AIMS TPC and the PhD workshop TPC as well as additional reviewers is highly acknowledged. Thanks also to Juan-Luis Gorriacho, Universitat Politècnica de Catalunya, Spain, and Thomas Schaaf, Ludwig-Maximilians-Universität, Germany, for setting up and organizing the tutorial sessions and test-bed hardware. Additionally, many thanks are addressed to the local organizers for enabling all logistics and hosting the AIMS 2013 event.

Finally, the editors would like express their thanks to Springer, and in particular Anna Kramer, for the smooth cooperation in finalizing these proceedings.

April 2013

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# Management and Monitoring Challenges in Content-Centric Networking

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**Abstract.** The current Internet paradigm and its core technologies have been designed to support connections between endpoints (hosts). It is widely deployed and IP (Internet Protocol) management tools are largely used by network operators. Yet, nowadays user needs are not host-centric; users care about accessing content. Recent research activities for the Future Internet point to information-centric networking (ICN), centered on the production, consumption, and transformation of information matching user interest, moving away from the current endpoint-oriented approach.

Several ICN solutions are proposed and amongst them, Content-centric Networking (CCN) is one of the most promising ones. However, CCN networks will not be deployed by a network operator, if a management solution will not be available. Having an efficient management system is a strong requirement to rapidly react to problems in the network.

Furthermore, a network operator needs to be aware of the traffic transiting in its network and, thus, needs to be able to monitor, classify, and qualify it. Research on ICN started 5-6 years ago, but there is not yet any significant effort on the management of such networks. It just started few months ago and a first proposal was presented in the 86<sup>th</sup> IRTF ICNRG meeting in March 2013.

Since this is a critical issue, this talk will focus on it from a network operator's point of view. This talk will also introduce the ICN paradigm, with a special focus on the CCN solution. Additionally, requirements and challenges for managing and monitoring the CCN network will be presented.

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