

Towards Management of Future Networks and Services: A Report on IEEE/IFIP NOMS 2010

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Abstract The 12th IEEE/IFIP Network Operations and Management Symposium (NOMS 2010) was held on April 19–23, 2010 in Osaka, Japan. Since 1988, NOMS, which has been held in even-numbered years, has been the primary forum for technical exchange among all constituencies in network and service management, including the research, vendor, standards, development, systems integration, service provider, user communities, and many others.

Keywords Network operations and management · Service management · Future networks and services · Future Internet

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1 Introduction

NOMS 2010 continued the 22 year tradition of NOMS (Network Operations and Management Symposium) and IM (International Symposium on Integrated Network Management) being the premier, primary forums of the IEEE Communications Society (ComSoc) and the International Federation for Information Processing (IFIP) for the technical exchange of the latest knowledge concerning network and service management. These forums focus on the research, development, integration, standards, service provisioning and user communities. NOMS 2010 was organized by the IEEE ComSoc Technical Committee on Network Operations and Management (CNOM) and by the International Federation for Information Processing (IFIP) Working Group 6.6 on Management of Networks and Distributed Systems (WG 6.6). As in previous NOMS editions, NOMS 2010 was a great success attracting over 370 researchers, practitioners, service providers, and vendors from 31 countries.

In the opening plenary session of NOMS 2010, the General Co-Chairs, James Hong and Nobuo Fujii, welcomed the attendees, mentioning the fact that, because of the unfortunate ash cloud over Europe, formed by the eruption of a volcano in Iceland, some presenters could not attend the conference after the sudden cancellation of international flights in the weekend that preceded the conference. Still, along the week, remote presentations via video and audio conference systems took place for papers whose presenters were not able to travel from Europe and Brazil. Those remote presentations were in fact quite effective, having led to discussions in the technical sessions as enthusiastic as those from papers presented live. Another important fact from NOMS 2010 is that, for the first time, a novel conference electronic evaluation system was used to track the opinion of the attendees about the overall quality of the symposium. Such a new system, tested in NOMS, will probably be used in other conferences from now on.

The theme of NOMS 2010 was “*Towards Management of Future Networks and Services.*” NOMS 2010 presented up-to-date approaches and technical solutions for novel management paradigms to deal with the new management issues in future infrastructures such as Web 2.0 or beyond, service environments, cloud computing platforms of large-scale and data centers, as well targeting the conventional issues in large and complex services, systems, and networks. We are beginning to experience key research challenges on future Internet infrastructures and services, and we believe that NOMS 2010 presented very significant research results towards overcoming these challenges. We believe that the advancements shown during NOMS 2010 will influence the research directions on future networks and services.

2 Program Overview

Organized in a 5-full day program, NOMS 2010 offered different types of activities, among which technical, application, mini conference, and poster sessions took the largest portion of the program time. Technical and mini conference sessions presented high-quality papers on the latest research results in the network operation

and management area. Application sessions presented papers focusing on the experience of information technology (IT) and telecommunications industries, such as service providers, operation support system (OSS) vendors, and equipment manufacturers. Poster sessions provided an insight into work-in-progress research. Panel sessions focused on business implications, market trends, and emerging applications and included panelists who are technology and business leaders. Finally, seven tutorials along with seven workshops completed the NOMS 2010 technical program.

3 Technical Sessions

201 research full papers, from 34 different countries, were submitted to NOMS 2010. Each paper was reviewed by at least three expert researchers in the area of network and services management. On October 29–30, 2009, during the 5th International Week on Management of Networks and Services (MANWEEK), the NOMS 2010 Technical Program Committee (TPC) met to identify a very selective group of 54 papers that were chosen (26.9% acceptance rate) to be presented in the symposium's technical sessions. Authors of the selected papers have been requested to take TPC comments into account and produce final versions of the papers that were included in the symposium's proceedings and the IEEE Xplore Digital Library.

NOMS 2010 technical sessions took place April 20–22, 2010 as the main activity of the conference. Sessions were organized in two parallel tracks composed of 8 sessions each, thus having 16 sessions in total. According to the attendance, among the topics that most captured the attention of the NOMS audience, the sessions on *virtualization*, *cloud management*, and *future Internet* merited special attention. They showed a clear trend on the management of modern infrastructures and services, and thus, they were quite aligned with this year's NOMS theme.

Based on the content of the papers, reviews, and presentations, the best paper selection committee discussed and unanimously selected the best paper to be the paper titled "Towards Adaptive Policy-based Management" by Raphael M. Bahati and Michael A. Bauer, and the best student paper to be the paper titled "Choking Polluters in Bit Torrent File Sharing Communities" by Flávio Roberto Santos, Weverton Luis da Costa Cordeiro, Luciano Paschoal Gaspar, and Marinho Pilla Barcellos.

4 Mini Conference, Application, and Poster Sessions

For the first time in the NOMS history, NOMS 2010 included a mini conference composed of 8 sessions where 27 high quality technical papers were presented. The mini conference was held on April 19, 2010 and thus prepared the audience for the activities of the symposium that followed. From the topics addressed by the mini conference sessions, we can highlight the sessions on *visualization*, *P2P*, *cloud management*, and *service management*.

As in previous NOMS and IM editions, NOMS 2010 included an application session program. Application sessions aim to complement the technical sessions with contributions that emphasize practical experiences and lessons learned in conjunction with management technology. They focused on aspects such as real-world deployment scenarios, experiences with the management of new services and technology, industrial applications of management technology, implementation examples of new management technology, organizational impact, and business cases. Application sessions also took place in April 20–22, 2010, and were composed of 10 papers.

As part of the technical program, there were 40 posters. NOMS posters offer the authors and attendees a chance to have an in-depth dialogue about work in its early stages, something that has benefit to researchers pursuing new directions. NOMS 2010 poster sessions presented innovative approaches and technical solutions for integrated systems and services management, including P2P and overlay networks, virtualization, wireless communications, autonomic management, and security.

5 Tutorials and Workshops

The symposium started with four tutorials covering relevant topics. Omar Cherkaoui (UQAM, Canada) gave a tutorial on “Network Virtualization Research Challenges.” Marat Zhanikeev (Waseda University, Japan) gave a tutorial on “Between Active and Passive Approaches to Network Performance Analysis.” Carlos Westphall (Federal University of Santa Catarina, Brazil) gave a tutorial on “Grid and Cloud Computing Management and Security.” John Strassner (POSTECH, Korea) gave a tutorial on “Management of Next Generation and Future Networks.” At the last day of NOMS 2010, three tutorials took place. John Strassner gave a second tutorial on “Autonomic Systems—Theory and Practice”. Katarzyna Wac (Carnegie Mellon University, USA) gave a tutorial on “Performance Evaluation of Mobile Systems and Services: Measurements-based Methodology and Example Assessment Techniques.” Finally, Nazim Agoulmine (Univ. d’Evry, France) gave a tutorial on “Smart Services for Elderly in the Home: Autonomic U-Care and U-Health.”

Workshops on specialized topics were held on the days before and after the NOMS technical program. Contributions to these workshops were reviewed separately from those for NOMS. NOMS 2010 workshops were well attended and included: “5th IEEE/IFIP International Workshop on Broadband Convergence Networks (BCN 2010)”, “5th IEEE/IFIP International Workshop on Business-driven IT Management (BDIM 2010)”, “2nd IEEE/IFIP International Workshop on Management of the Future Internet (ManFI 2010)”, “3rd IEEE/IFIP International Workshop on Bandwidth on Demand (BoD 2010)”, “1st IEEE/IFIP International Workshop on Knowledge Management for Future Services and Networks (KMF-SAN 2010)”, “1st IEEE/IFIP International Workshop on the Management of the Smart Grid (SmartGridMan 2010)”, and “1st IEEE/IFIP International Workshop on Cloud Management (CloudMan 2010).”

6 Keynotes and Panels

Six keynote speakers shared their visions at the symposium. Noritaka Uji (Sr. Executive VP, NTT CTO and CIO, Japan) delivered a speech on “Toward the Future Broadband & Ubiquitous Society: NTT’s Challenges for a Service Creation Business Group,” stressing the expansion of broadband access services in Japan, as well as providing a panorama about trends on ICT businesses. Hideo Miyahara (President of NICT, Japan) gave a speech on “The Concept of a New Generation Network.” He discussed the challenges to be faced in the next 50 years of the information society. David G. Belanger (Chief Scientist, AT&T Labs, USA) gave a speech entitled “Operations—It’s the Data,” where he discussed the difficulties on the operations of large scale infrastructures with huge amounts of network information to be treated. Vijay Koduri (Senior Product Marketing Manager, Google, USA) gave a speech on “Global Knowledge Sharing, Innovation, and Social Networking,” when he presented how modern social networks have been providing valuable information to create the next general Web applications. Yuan-Kuang Tu (President, Chungwha Telecom Labs, Taiwan) gave a speech on “Grow with Green: The Way for Telco to Thrive,” and discussed strategies in the telecommunication industry to save natural resources towards more green infrastructures. Jamie Erbes (VP & Chief Technology Officer, Software & Solutions HP Software & Solutions. Hewlett-Packard Company, USA) gave a speech on “Enterprise IT and the Cloud Disruption” where she discussed how service sources would interact with one another in the new era where cloud structures play a key role.

NOMS 2010 featured state-of-the-art panels from leading experts in their fields. All panels addressed highly important and relevant subject areas of systems, network, and service management. NOMS 2010 included six panel sessions on the topics of: “Managing with ITIL: The Role of Creativity in a Framework Driven Environment”, “Managing Our Environment”, “Knowledge Management, Social Networks, and Global Communities”, “Transition and Steady State Service Management in the Cloud”, “Programmable Networks—Networking Game Changer or DOA?”, and “Distinguished Experts Panel.”

7 Next Conferences

The next events that follow the strong traditional, long-standing track record of excellence and coverage will be the IEEE/IFIP International Conference on Network and Service Management (CNSM 2010, Niagara Falls, Canada), the 12th IFIP/IEEE International Symposium on Integrated Network Management (IM 2011, Dublin, Ireland), and the 13th IEEE/IFIP Network Operations and Management Symposium (NOMS 2012, Maui, Hawaii, USA).

8 Concluding Remarks

We are certain that the activities of NOMS 2010 (technical sessions, mini conference, application sessions, posters, keynotes, panels, tutorials, and

workshops) formed a very exciting set of research work that enabled authors, presenters, and attendees to exchange valuable experiences that will continue to advance the state-of-the-art on the theme of the Symposium.

Author Biographies

Lisandro Zambenedetti Granville is Professor at the Federal University of Rio Grande do Sul (UFRGS), Brazil, having received his Ph.D. (2001) degree from the same University. He was a visiting researcher at the University of Twente, the Netherlands, in 2007 and 2008. Lisandro has served as TPC Co-Chair of DSOM 2007 and LANOMS 2009, as well as General Co-Chair of LANOMS 2005 and LAACS 2009. Currently, he is Technical Program Chair of the Committee on Network Operations and Management (CNOM) of the IEEE Communications Society, member of the Brazilian Internet Committee (CBG.br), and member of the Brazilian Computer Society (SBC) board of directors.

Deep Medhi is Professor at University of Missouri-Kansas City (UMKC). He obtained the Ph.D. (1987) degree from the University of Wisconsin-Madison. He was with AT&T Bell Laboratories, New Jersey from 1987 to 1989. He is also an adjunct professor of the Indian Institute of Technology-Guwahati. His research has been funded by Defense Advanced Research Project Agency (DARPA), National Science Foundation (NSF), Sprint Corporation, and Doris Duke Charitable Foundation. He has published over ninety peer-reviewed papers, and co-authored two books: *Routing, Flow, and Capacity Design in Communication and Computer Networks* (July 2004) and *Network Routing: Algorithms, Protocols, and Architectures* (March 2007), both published by Morgan Kaufmann Publishers (an imprint of Elsevier).

Yoshiaki Kiriha is a research expert in Strategic Headquarters for New Generation Network R&D, National Institute of Information Communications Technology (NICT), Japan. He received a M.S. degree in Electrical Engineering from WASEDA university on 1987, then he joined NEC where he has been involved in R&D projects such as network fault diagnosis expert system, distributed network management platform, management by delegation, active network protocols and platform, and ubiquitous networking middleware whose core technologies have been transferred into product division. He is also active in academic activities, and has contributed to many IEICE and IEEE committees and conferences like IEICE ICM, APNOMS, and DSOM/IM/NOMS.

James Won-Ki Hong is Head of Division of IT Convergence Engineering and professor in the Department of Computer Science and Engineering, POSTECH, Korea. He received his Ph.D. (1991) degree from the University of Waterloo, Canada. James has served as Technical Chair (1998–2000), Vice Chair (2003–2005), and Chair (2005–2009) for IEEE's ComSoc Committee on Network Operations and Management (CNOM). He is a NOMS/IM and APNOMS Steering Committee Member and Director of Online Content for the IEEE ComSoc (2004–2005 and 2010-present). He was technical Co-Chair of NOMS 2000 and APNOMS'99, as well as General Chair for APNOMS 2006 and General Co-Chair for APNOMS 2008 and NOMS 2010. James is an editorial advisory board member of JNSM, IJNM, JTM, and TNSM, and editor-in-chief of the KNOM Review Journal.

Nobuo Fujii is a vice president of NTT Advanced Technology Corporation and a business unit manager of developing and deploying various operation support systems. He received B.E. (1977) and M.E. (1979) degrees from Osaka University, Japan. He joined (1979) the Electrical Communication Laboratories, Nippon Telegraph and Telephone Public Corporation (now NTT). Nobuo has been an active member in Network and Systems Management Standards including TM Forum, ISO/IEC SC21, ITU-T SG4 and HGI. He is member of IEEE and life fellow of IEICE of Japan. He was chairman of TTC Technical Assembly and vice-chairman of ITU-T SG4 (1996–2008). He was TPC Co-Chair of APNOMS2003, General Chair of APNOMS2005, DEP Chair of APNOMS2007, and General Co-Chair of NOMS 2010. He is a standing committee member of APNOMS.