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REPORT

Managing Clouds, Smart Networks and Services: A Report on APNOMS 2011

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Abstract This article presents a report on APNOMS 2011, which was held September 21–23, 2011 in Taipei, Taiwan. The theme of APNOMS 2011 was "Managing Clouds, Smart Networks and Services."

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1 Introduction

The 13th Asia–Pacific Network Operations and Management Symposium (APNOMS 2011, http://www.apnoms.org/2011/) was held on September 21–23, 2011 in Taipei, Taiwan. This was the first time an APNOMS was held in Taiwan. APNOMS 2011 was organized by KICS KNOM (Korea Information and Communications Society, Korean Network Operations and Management Committee) and IEICE ICM (Institute of Electronics, Information and Communication Engineers, Technical Committee on Information and Communication Management) with support from IEEE CNOM (Committee on Network Operations and Management), IEEE APB (Asia Pacific Board), CIEE (The Chinese Institute of Electrical Engineering), CHT (Chunghwa Telecom), NIU (Nation I-Lan University), NTU (National Taiwan University) and IFIP WG 6.6. APNOMS 2011 continues to play an important role for exchanging and discussing all aspects of operations and management of telecommunications networks, enterprise networks, Internet and their services among the academic community and the telecommunication industry at large in the Asia–Pacific region. As in the previous APNOMS symposia [1–11], APNOMS 2011 was a great success, attracting over 240 researchers, policy makers, practitioners, service providers, and vendors from 14 countries.

The theme of this symposium was "Managing Clouds, Smart Networks and Services." Research and development on Clouds, Smart Networks and Services have been carried out around the world over the last few years and we are already seeing their deployments and operations in many parts of Asia–Pacific countries. We are also beginning to experience new and interesting services that utilize these Clouds as well as Smart Networks. We are certain that we will see more deployment of Clouds, Smart Networks and Services in the next few years. Thus, the operations and management of Clouds, Smart Networks and Services have become very important to the network operators and service providers.

As synopsized below, APNOMS 2011 had prepared an excellent 3-full day program with keynotes, tutorials, technical sessions, special sessions, a distinguished experts panel, poster sessions, innovation sessions and exhibitions with the theme in mind. This year, we have received 138 submissions of technical papers and we are certain that the selected 47 technical papers (acceptance rate of 29.9%) are high-quality treatises on the latest hot topics in the fields of network operations and service management.

2 Tutorials

The symposium started with five tutorials in three tutorial sessions covering the latest hot topics. The first tutorial session consisted of three 1-hour tutorials, dealing with important parts of "Disaster Recovery Focusing on the 2011 Earthquake in

Japan", Yukio Ito (NTT Communications, Japan) gave a tutorial on "The Damage and Restoration of Backbone Networks Regarding the Great East Japan Earthquakes." He introduced the earthquake strike on eastern Japan and impact on their telecom facilities. He also explained their disaster-proof network and quick disaster recovery by showing experiences that recovered the affected international submarine cables. Hideaki Kimura (NTT Access Network Service Systems Labs., Japan) then gave a tutorial on "Technologies for Disaster Recovery and Measures in Access Network Systems." He introduced how the earthquake of Japan damaged NTT's access networks, and showed how they have developed and applied quake- and tsunami-resistance technologies Lastly, Yuji Maeda (NTT Service Integration Labs., Japan) gave a tutorial on "Emergency Management in Disaster-Resilient Society." He introduced how the Japanese society responded against 2011 Earthquake and disasters and crisis could be prepared using distributed ICT systems, and described their Incident Command System (ICS) as the emergency management system for achieving resilient society.

In the second tutorial session, Myung-Sup Kim (Korea University, Korea) gave a tutorial on "Development of a Real-time Application Traffic Classification System." This tutorial introduced methods and algorithms for monitoring and analyzing Internet applications traffic, which is essential in understanding the behavior of the networks by the operators. In the third tutorial session, Yeali Sun (National Taiwan University, Taiwan) gave a tutorial on "Application Performance Management in Clouds." She introduced modern Internet applications involve a large number of components that have complex relationships with each other, and showed Application Performance Management (APM) is beneficial to many applications and services by analyzing Dynamic Resource Management in APM. This tutorial attracted many participants and generated discussions on this timely topic of managing Clouds.

3 Keynotes

Five keynote speakers shared their visions at the symposium. Three out of five speakers talked about Clouds. The speakers provided excellent speeches on the current status and R&D directions on Cloud development and services in the Asia–Pacific region. Prof. Si-Chen Lee (NTU, Taiwan) delivered a speech on "Taiwan's Energy Situations and Solutions," introduced Taiwan's current status for energy usage and the environmental situation and showed how they have developed technologies to reduce the greenhouse gases and how to use renewable energy in Taiwan. Dr. Yen-Sung Lee (CHT, Taiwan) gave a speech on "Transformation with Cloud Computing." He introduced the CHT's latest strategy for the Cloud Solutions and Strategies. Dr. Seong-Choon Lee (KT Network R&D Lab, Korea) gave a speech on "Security Issues and Research Challenges in Public Cloud Computing." He introduced why we should consider security aspects of the Clouds services and KT's strategy for competitive Clouds services with consolidated security functionalities. Prof. Tomonori Aoyama (Keio University, Japan) gave a speech on "Cloud Computing and New Generation Network toward ICT Paradigm Shift."

He summarized recent disasters in Japan and Future Internet activity of the Japanese community, and emphasized why and how our paradigm should be shifted with Future Internet technologies and Clouds services. Joel Fleck (HP Software and Solutions, USA) gave a speech on "Semantic, Context-Aware Management." He introduced emerging environments including Cloud and SOA and Dynamic Inter-Domain Management Environment, and emphasized adaptive management as a new vision by showing Inter-domain Relationship Management Architecture.

4 Technical, Poster and Innovation Sessions

The main body of the Symposium consisted of 10 technical sessions, three poster sessions, and two innovation sessions. Forty-seven papers were selected as full papers with oral presentations in the technical sessions and 53 papers were selected as short papers with poster-style presentations.

Accepted papers and posters presented the latest results of research and development in the operations and management of converged networks and services, covering research areas including: Management in Virtual Environments, Policy Management, Traffic Management, Management of Mobile and Wireless Networks, Network Operations Management, Management Practices and Logistics, QoS and Performance Management, Management in New Environments, Content Management and Smarter Management. Many papers focused on the management of Clouds and Smart Networks and Services. Many sessions including Management Practices and Logistics, QoS and Performance Management, and Management in New Environments were evaluated very well, but this year, the Policy Management session was the most attractive. Out of the 10 technical sessions, the following sessions had the largest audience size indicating the importance and popularity of the topics: Network Operations Management, Management in Virtual Environments and Traffic Management. There were VISA problems for students from China to these students could not attend the symposium physically. Thus, 6 papers whose first author is Chinese were presented by showing pre-recorded voice over Powerpoint presentations.

Also, the Innovation Sessions were organized to present and to discuss ongoing research, work-in-progress ideas, practical solutions, experimental studies, and various topics of interest to the community. Twelve papers were selected and presented in the innovation sessions, whose topics were Cloud Services, Virtual Networks, IPTV STB, IPTV service framework, SAN and ad-hoc networks.

5 Special Sessions

Two special sessions were held on the second and third day of the symposium. Eight representatives of various countries from Asia–Pacific discussed "Smart Network/Device Service and Management" and "Cloud Service and Management." On the second day, four speakers gave talks on international emerging issues—Smart Networks and Services as well as M2M technology. Yu-Huang Chu (CHT, Taiwan)

gave a talk on "Smart Cloud Computing Network Architecture and Services," and defined required technologies for a smart cloud network as Software Defined Network (SDN)—Openflow, OpenStack, Locator/ID Separation Protocol (LISP) and Content Centric and Autonomic Network. He emphasized that the LISP architecture would become critical in the Future Cloud Computing Services. Irene Hsu (Telecordia, USA/Taiwan) gave a speech on "An M2M Integrated Platform for Telematics Services and Applications," and introduced how M2M technology can be integrated with Telematics Services. Masayoshi Ohashi (KDDI, Japan) gave a talk on "Service Platform for Supporting Multi-domain Networks and Devices." He introduced the CUBIQ (Cross UBIQuitous platform) architecture as KDDI's 3M vision to support new emerging areas toward sustainable society. Yeong-il Seo (KT, Korea) gave a talk on "Paradigm Shift From Dumb To Smart Pipe," and defined the smart networks in the viewpoint of ISPs and emphasized the importance of the smart network open API as well as the smart network evolution model.

On the third day, four other speakers gave talks on Cloud Service and Management as current hottest issues. Ruay-Shiung Chang (NDHU, Taiwan) gave a talk on "Cloud Computing Management: What and How?," and introduced newly emerging systems to manage Cloud Services in the two focuses on server side multiple data centers management and client side cloud usage management. Tzi-cker Chiueh (ITRI, Taiwan) gave a talk on "Peregrine: An All-Layer-2 Network in the ITRI Container Computer," He introduced design issues of a Cloud Data Center Network and presented technical challenges in the fully integrated solution. Seung-Hee Han (KT, Korea) gave a talk on "Security Issues and Strategies for Mobile Cloud Services," and introduced security threats for mobile computing services. She presented the comparisons of policies and frameworks of several mobile cloud services, and showed mobile cloud security architecture on security strategy for mobile cloud services. Eric Chen (FalconStor, USA/Taiwan) gave a talk on "Intelligent and Open Networked Storage Systems for the Next-generation Computing," and presented Cloud computing from networked storage perspectives. He presented open issues and a reference model for networked storage.

6 Exhibitions

The exhibition program provided an opportunity for vendors and service providers to exhibit their latest OSS technologies, tools, platforms, products and systems. This program also provided an excellent environment for operators, researchers and academics to interact with the exhibitors. Five companies including Chunghwa Telecom (Taiwan), KT (Korea), TWNIC (Taiwan), NTT Comware (Japan) and Mobile Communications Networking Lab of National Taiwan University (Taiwan) participated in the exhibition program. Chunghwa Telecom demonstrated LTE/LTE-A System-Level Simulator and Smart Management for Mobile Data Offloading solution in two booths. KT demonstrated their DDoS Attack Defense Solution. TWNIC demonstrated IPv6 Development and Deployment, and NTT Comware demonstrated Trouble Detection Technology based on the number of system

messages. Mobile Communications Networking Lab of National Taiwan University demonstrated their Intelligent Social Networks Platform.

7 Distinguished Experts Panel

APNOMS 2011 ended with a very exciting distinguished experts panel (DEP) on the symposium's theme of "Managing Clouds, Smart Networks and Services." Chaired by Fei-Pei Lai (National Taiwan University, Taiwan), five DEP panelists, Rong-Syh Lin (CHT, Taiwan), Atsushi Takahara (NTT, Japan), Tae-Sang Choi (ETRI, Korea), Joel J. Fleck (HP, USA), and Henry Chang (IBM, USA) discussed and debated a large range of issues on the APNOMS 2011 theme. These issues included "Digital Rainforest as an enabler of a prospering digital economy echo system", "Operational flexibility", "Standardization and Research View", "Semantic and Context-Aware Management" and "Smart City cloud computing service applications."

Cloud services and business issues and Smart networks and services issues were introduced as key technologies by the panelists. Some management system architectures were also introduced by them to show how the Clouds and Smart Networks and their services would be managed. More than 1 h was spent to discuss the symposium's theme, especially functionalities to be implemented for Clouds business, such as policy-based management, ubiquity, and network virtualization including OpenFlow, perfSONAR and network QoS/Customer QoE. All panelists stressed that the management functionalities would be essential with Smart networks and services in a cloud. In addition, there were many discussions on questions from the audiences. Especially, the standardization of cloud computing and the federation among stakeholders of the cloud computing facility from the viewpoint of green computing were hotly debated. The discussion concluded by suggesting upon which areas to concentrate research, namely policy-based management, traffic management, context awareness, semantic management, QoS/QoE control and security management.

8 APNOMS 2011 Best Paper Awards

The APNOMS 2011 organizing committee selected the top three papers presented in the technical session for the "Best Paper Award". The Best Paper Award Committee was organized as eight members—two or three members from each country—Japan, Korea and Taiwan for selecting best papers. Before the symposium, six papers were nominated for best paper consideration. Representatives from each country nominated the two papers from their country with the highest review scores. The award committee evaluated the nominees' presentations and finally selected three papers with the highest overall (paper and presentation) scores. The selected papers were "A Multipath Creation Algorithm Optimizing Traffic Dispersion on Networks," by Hiroshi Matsuura (NTT, Japan), "Usage Pattern Analysis of Smartphones," by Joon-Myung Kang, Sin-Seok Seo, James W. Hong

(POSTECH, Korea), and "Building an Intelligent Provisioning Engine for IaaS Cloud Computing Services," by Jia-Bin Yuan, Yi-Ching Lee, Wudy Wu, Hey-Chyi Young, Kuan-Hsiung Liang (Chunghwa Telecom Labs., Taiwan).

9 Concluding Remarks

In APNOMS 2011, the technical and short paper session papers were published in IEEE Xplore for the first time in the APNOMS history. Also, the proceedings have been distributed to the participants in an USB, which also included all innovation session papers, and presentation materials of keynote speeches, and special sessions.

APNOMS 2011 was a very successful symposium. It was well attended and the feedback on all aspects of the symposium organization, in particular, on the technical program was very positive. It contributed to the growth of APNOMS into a very important international symposium as it was held in Taiwan for the first time in its history. The audience's feedback reinforced the positive aspects of the symposium: a good mixed participation from both industry and academia in technical contributions, the tradition of special sessions focusing on experiences and lessons learned by different countries in this region, excellent venue and social events, and the overall collaborative, interactive and friendly atmosphere of the symposium.

The keynote and DEP presentations as well as the pictures taken at the symposium are all available from the symposium website: http://www.apnoms.org/2011.

APNOMS 2012 will be held September 25–27, 2012 in Seoul, Korea. For more information, please visit http://www.apnoms.org/2012.

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Choong Seon Hong received his BS and MS degrees in electronics engineering from Kyung Hee University, Seoul, Korea, in 1983, 1985, respectively. In 1988 he joined KT, where he worked on Broadband Networks as a member of the technical staff. From September 1993, he joined Keio University, Japan. He received the Ph.D. degree from Keio University in 1997. He worked for the Telecommunications Network Lab, KT as a senior member of technical staff and as a director of the networking research team until August 1999. Since September 1999, he has been a professor of the Department of Computer Engineering, Kyung Hee University, Korea. He also has served as a program committee member and an organizing committee member for international conferences such as NOMS, IM, APNOMS and so forth.

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