### 2017 19th Asia-Pacific Network Operations and Management Symposium (APNOMS 2017)

Seoul, South Korea 27-29 September 2017



**IEEE Catalog Number: ISBN:** 

CFP1717R-POD 978-1-5386-1102-9

### Copyright © 2017 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP1717R-POD

 ISBN (Print-On-Demand):
 978-1-5386-1102-9

 ISBN (Online):
 978-1-5386-1101-2

#### **Additional Copies of This Publication Are Available From:**

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



### **Technical Session**

	nical Session 1: Vehicular and Maritime Wed. Sep. 27, 14:25~16:05(100 min), Room A
	Chair: Dr. Woojin Seok (KISTI, Korea)
1-1	A Framework for Discovering Maritime Traffic Conflict from AIS Network 1 Po-Ruey Lei*, Tzu-Hao Tsai**, Yu-Ting Wen**, and Wen-Chih Peng** (*ROC Naval Academy, Zuoying, Taiwan, **National Chiao Tung University, Hsinchu, Taiwan)
1-2	Adaptive Shipborne Base Station Sleeping Control for Dynamic Broadband Maritime Communications 7 Ailing Xiao, Ning Ge, Liuguo Yin, Chuan'ao Jiang, and Shaohua Zhao (Tsinghua National Laboratory for Information Science and Technology, Beijing, China)
1-3	Scalable TDMA Cluster-based MAC (STCM) for Multichannel Vehicular Networks 13 Nurullah Shahin and Young-Tak Kim (Yeungnam University, Korea)
1-4	Collaborative Security Attack Detection in Software-Defined Vehicular Networks 19 Myeongsu Kim, Insun Jang, Sukjin Choo, Jungwoo Koo, and Sangheon Pack (Korea University, Seoul, Korea)
	nical Session 2: Traffic Analysis and QoS Wed. Sep. 27, 14:25~16:05(100 min), Room B Chair: Prof. Byung-Seo Kim, (Hongik University. Korea)
2-1	A QoS-based ONU Group Planning Algorithm for Smart Grid Communication Network 25  Jun-Hai Lu*, Fan-Bo Meng*, Dong Guo**, Ying Li***, Si-Ya Xu***, and Xing-Yu Chen*** (*State Grid Liaoning Electric Power Company, Shenyang, China, **Beijing Guodiantong Network Technical Co. LTd., Beijing, China, ***Beijing University of Posts and Telecommunications, Beijing, China)
2-2	Emerging Network Technologies and Network Neutrality Conformance 31 Ramneek*†, Patrick Hosein**, Woojin Seok*†, Jai-Seung Kwak†, and Alexandr Ni*† (*Korea University of Science and Technology, Daejeon, Korea, †KISTI, Daejeon, Korea, **The University of the West Indies, Trinidad and Tobago)
2-3	Building IP Geolocation Database from Online Used Market Articles 37 Hyunsu Mun and Youngseok Lee (Chungnam National University, Korea)
2-4	Identification of User Behavior from Flow Statistics 42 Shingo Ata*, Yusuke Iemura*, Nobuyuki Nakamuray**, and Ikuo Oka* (*Osaka City University, Osaka, Japan, **Oki Electric Industry Co., Ltd., Osaka, Japan)
	nical Session 3: SDN and NFV Wed. Sep. 27, 16:35~18:15(100 min), Room A Chair: Prof. Po-Ruey Lei, (ROC Naval Academy, Taiwan)
3-1	Regional Fault Tolerant Recovery Mechanism for Multilayer Networks 48 Xiaomei Wang, Lanlan Rui, Xuesong Qiu, Ying Li, and Siya Xu (Beijing University of Posts and Telecommunications, Beijing, China)
3-2	Knowledge-Defined Networking using In-band Network Telemetry 54  Jonghwan Hyun and James Won-Ki Hong (POSTECH, Pohang, Korea)
3-3	Enabling Network Function Virtualization over Heterogeneous Resources 58 Thomas Lin, Naif Tarafdar, Byungchul Park, Paul Chow, and Alberto Leon-Garcia (University of Toronto, ON, Canada)
3-4	A Novel vCPE Framework for Enabling Virtual Network Functions with Multiple Flow Tables Architecture in SDN Switches 64 Nen-Fu Huang, Chi-Hsuan Li, Chia-Chi Chen, I-Hsien Hsu, Che-Chuan Li, and Ching-Hsuan Chen (National Tsing Hua University, Hsinchu, Taiwan)

### **Technical Session**

	echnical Session 4: SDN and Fault Management rate: Thu. Sep. 28, 10:30~12:10(100 min), Room A Chair: Dr. Haruo Oishi (NTT, Japan)	
4-1	Service Failure Diagnosis in Service Function Chain 70 Shilei Zhang, Ying Wang, Wenjing Li, and Xuesong Qiu (Beijing University of Posts and Telecommunications, Beijing, China)	
4-2	Towards ONOS-based SDN Monitoring using In-band Network Telemetry 76 Nguyen Van Tu, Jonghwan Hyun, and James Won-Ki Hong (POSTECH, Pohang, Korea)	
4-3	Towards Comprehensive Protection for OpenFlow Controllers 82 Shengzhi Zhang*, Xiaoqi Jia**, and Weijuan Zhang*** (*Florida Institute of Technology, USA, **CAS, Beijing, China, ***University of Chinese Academy of Science, Beijing, China)	
4-4	Design of Optical Aggregation Network with Carrier Edge Functions Virtualization 88 Takashi Miyamura*, Akira Misawa*, and Jun-ichi Kani** (*NTT Corporation, Tokyo, Japan, **NTT Corporation, Kanagawa, Japan)	
و مام ما	rical Cassian F. CDN and Camina Management	
	nical Session 5: SDN and Service Managment Thu. Sep. 28, 10:30~12:10(100 min), Room B Chair: Prof Young-Tak Kim (Yeungnam University, Korea)	
	Thu. Sep. 28, 10:30~12:10(100 min), Room B  Chair: Prof. Young-Tak Kim (Yeungnam University, Korea)  OpenAPI-based Message Router for Mashup Service Development 94	
ate:	Thu. Sep. 28, 10:30~12:10(100 min), Room B  Chair: Prof. Young-Tak Kim (Yeungnam University, Korea)	
oate : 5-1	Thu. Sep. 28, 10:30~12:10(100 min), Room B  Chair: Prof. Young-Tak Kim (Yeungnam University, Korea)  OpenAPI-based Message Router for Mashup Service Development 94  Doyoung Lee, Seyeon Jeong, and James Won-Ki Hong (POSTECH, Pohang, Korea)  A Survivability-based Backup Approach for Controllers in Multi-controller SDN against Failures 100  Lingyu Zhang, Ying Wang, Wenjing Li, Xuesong Qiu, and Qinghong Zhong (Beijing University of Posts	

Technical Session 6: Security	
Date : Thu. Sep. 28, 13:10~14:50(100 min), Room B	
Chair: Prof. Kyungbaek Kim (Chonnam National University, Korea)	
An Integrated Security Monitoring System for Digital Service Network Devices 118 Wen-Lin Cheng, Ting-Che Chuang, Chien-Wen Yang, Yueh-Hsien Lin, Min Liu, and Chuan Yin (Chunghwa Telecom Laboratories Co., Ltd., Taoyuan, Taiwan)	
Firmware over the Air for Home Cybersecurity in the Internet of Things 123 Che-Chun Teng, Jia-Wei Gong, Ya-Shian Wang, Chin-Ping Chuang, and Mei-Chun Chen (Chunghwa Telecom Laboratories Co., Ltd., Taoyuan, Taiwan)	
Design and Implementation of Security System for Cloud Storage 129  Ju-Shu Chueh and Min-Te Sun (National Central University, Taoyuan, Taiwan)	
Threshold Estimation in Self-Destructing Scheme Using Regression Analysis 135 Young Ki Kim and Choong Seon Hong (Kyung Hee University, Korea)	

#### **Technical Session**

Tochi	nical Session 7: Cloud and Fog Computing
	Thu. Sep. 28, 15:20~17:00(100 min), Room B
	Chair: Prof. Kazuhiko Kinoshita (Tokushima University, Japan)
7-1	Multi-stage Stackelberg Game Approach for Colocation Datacenter Demand Response 139 Minh N. H. Nguyen, DoHyeon Kim, Nguyen H. Tran, and Choong Seon Hong (Kyung Hee University, Korea)
7-2	Distributed Analytics in Fog Computing Platforms Using TensorFlow and Kubernetes 145 Pei-Hsuan Tsai, Hua-Jun Hong, An-Chieh Cheng, and Cheng-Hsin Hsu (National Tsing Hua University, Hsin-Chu, Taiwan)
7-3	Queueing Theoretic Approach to Job Assignment Strategy Considering Various Inter-arrival of Job in Fog Computing 151 Tomoya Mori, Yoichi Utsunomiya, Xuejun Tian, and Takashi Okuda (Aichi Prefectural University, Aichi, Japan)
7-4	iSDF: an Integrated Software-defined Computing Framework for Scientific Experiments 157 Seoyoung Kim*, Julim Ahn*, Heewon Kim*, Yoonhee Kim*, and Jieun Choi** (*Sookmyung Women's University, Seoul, Korea, **KISTI, Daejeon, Korea)
	nical Session 8: IoT and WLAN
Date:	Fri. Sep. 29, 10:30~12:10(100 min), Room A Chair: Prof. Guey-Yun Chang (National Central University, Taiwan)
8-1	Traffic Management using Value Function-based Regulation 163 Yuncheng Zhu*, Hideki Okita** (*Research & Development Group, Hitachi, Ltd, Japan, **Future Investment Division, Hitachi, Ltd., Japan)
8-2	Backhaul Virtualization for Multiple Services in Public WLANs 175 Kazuki Ginnan*, Keita Kawano**, Kazuhiko Kinoshita***, Hiroki Nakayama****, Tsunemasa Hayashi****, and Takashi Watanabe* (*Osaka University, Japan, **Okayama University, Japan, ***Tokushima University, Japan, ****BOSCO Technologies Inc., Japan)
8-3	Ruin Theory Based Modeling of Fair Spectrum Management in LTE-U 181 Aunas Manzoor, Nguyen H. Tran, and Choog Seon Hong (Kyung Hee University, Korea)
	nical Session 9: Wireless Network and CDN Fri. Sep. 29, 10:30~12:10(100 min), Room B Chair: Prof. Sangheon Pack (Korea University, Korea)
9-1	A Hybrid Pull-Push Protocol in Hybrid CDN-P2P Mesh-based Architecture for Live Video Streaming 187 Teerapat Sanguankotchakorn and Nonpawich Krueakampliw (Asian Institute of Technology, Pathumthani, Thailand)
9-2	D2D Communications under LTE-U System: QoS and Co-existence Issues are Incorporated 193 Anupam Kumar Bairagi and Choong Seon Hong (Kyung Hee University, Korea)
9-3	Layered Video Communication in ICN Enabled Cellular Network with D2D Communication 199 Saeed Ullah, Tuan LeAnh, Anselme Ndikumana, Md. Golam Rabiul Alam, and Choong Seon Hong (Kyung Hee University, Korea)

Performance Measurements of 360° Video Streaming to Head-Mounted Displays Over Live 4G

Wen-Chih Lo, Ching-Ling Fan, Shou-Cheng Yen, and Cheng-Hsin Hsu (National Tsing Hua University,

Cellular Networks 205

Hsin-Chu, Taiwan)

9-4

ate:	Thu. Sep. 28, 10:00~10:30(30 min)/ 14:50~15:20(30 min), Lobby
	Chair: Prof. Cheng-Hsin Hsu (National Tsing Hua University, Taiwan)
1-1	The Exploration of Machine Learning for Abnormal Prediction Model of Telecom Business Support System 211 Jen-Hao Chen, Chao-Wen Huang, and Chia-Chun Shih (Chunghwa Telecom Co., Ltd., Taiwan)
1-2	Using Kernel Density Estimation to Target Customer Complaint Handling Service 215 Hsin-Chieh Chao, Kai-An Tang, Yin-Hsin Liu, and Chang-Yu Hsu (Chunghwa Telecom Laboratories, Taoyuan, Taiwan)
1-3	Orchestration of NFV Virtual Applications Based on TOSCA Data Models 219 Yuan-Mao Hung, Shih-Che Chien, and Yung-Yi Hsu (Chunghwa Telecom Laboratories, Taoyuan, Taiwan)
1-4	Effect of the penalty on the QoS received by multihomed clients 223 Rohit Tripathi (Indian Institute of Information Technology Guwahati, Guwahati, India)
1-5	Load Balancing for Multiple Controllers in SDN Based on Switches Group 227 Yaning Zhou, Ying Wang, Jinke Yu, Junhua Ba, and Shilei Zhang (Beijing University of Posts and Telecommunications, Beijing, China)
1-6	Classification-Based Elephant Flow Detection Method using Application Round on SDN Environments 231 Yuan-Hao Huang, Wen-Yueh Shih, and Jiun-Long Huang (National Chiao Tung University, Hsinchu, Taiwan)
1-7	Design and Implement a Mobile Badminton Stroke Classification System 235 Juyi Lin, Chia-Wei Chang, Chih-Hao Wang, Hong-Chuan Chi, Chih-Wei Yi, Yu-Chee Tseng, and Chih-Chuan Wang (National Chiao Tung University, Taiwan)
1-8	Location-aware Dynamic Network Provisioning 239 Van-Quyet Nguyen, Sinh-Ngoc Nguyen, Deokjai Choi, and Kyungbaek Kim (Chonnam National University, Gwangju, Korea)
1-9	Suspicious Traffic Detection Based on Edge Gateway Sampling Method 243 Sinh-Ngoc Nguyen, Jintae Choi, and Kyungbaek Kim (Chonnam National University, Gwangju, Korea)
1-10	Could We Beat A New Mimicking Attack? 247  Degang Sun*†‡, Kun Yang†‡, Bin Lv†‡, and Zhixin Shiy† (*Beijing University, Beijing, China, †Chinese Academy of Sciences, Beijing, China, ‡University of Chinese Academy of Sciences, Beijing, China)
1-11	File Transfer Framework with Multipath Transfer in Heterogeneous Networks for Disaster Recovery Kyu-Hwan Lee, Dong-Hyuk Jang, and Sung-Jae Lee (Agency for Defense Development, DaeJeon, Korea)
1-12	Evaluating Scheduling Strategies in LOD Based Application 255  Usman Akhtar, Muhammad Bilal Amin‡, and Sungyoung Lee (Kyung Hee University, Korea,  ‡Korea Research Foundation (KRF) and UCLab, Kyung Hee University)
1-13	Sky-Scope: Skype Application Traffic Identification System 259 Sung-Ho Lee, Young-Hoon Goo, Jee-Tae Park, Se-Hyun Ji, and Myung-Sup Kim (Korea University, Sejong, Korea)
1-14	High-Reliable WDM Optical Access Network Expanding by Double Fiber-Tangent-Ring Topology 26 Qi Shao*, Yu Shao**, Ying Li***, and Si-Ya Xu*** (*Henan electric power corporation, Henan, China, **Zhengzhou power supply company, Henan, China, ***Beijing University of Posts and Telecommunications, Beijing, China)
1-15	Experimental evaluation of a path switching function to avoid delay spikes in wireless LANs 267 Kazumasa Goto, Kazuya Okuda, Ryohei Nakamura, and Hisaya Hadama (National Defense Academy of Japan, Japan)

1-16	Survey on Network Protocol Reverse Engineering Approaches, Methods and Tools 271 Baraka D. Sija*, Young-Hoon Goo*, Kyu-Seok-Shim*, Sungyun Kim**, Mi-Jung Choi**, and Myung-Sup Kim* (*Korea University, Sejong, Korea, **Kangwon National University, Chuncheon, Korea)
1-17	Feasibility Study for Simulating Community Based Content Caching on CCN Network Using ndnSIM Simulator 275 Suman Pandey*†, Yang-Sae Moon† and Mi-Jung Choi† (*Daegu Catholic University, Korea, †Kangwon National University, Chuncheon, Korea)
1-18	Design and Implementation of a Service-Oriented Network Provisioning System for Network as a Service 280 Tse-Han Wang*, Yen-Cheng Chen**, Chen-Min Hsu*, Kai-Sheng Hsu*, and Hey-Chyi Young* (*Chunghwa Telecom Laboratories, Taoyuan, Taiwan, **National Chi Nan University, Taiwan)
1-19	Topology Design for Multihop Cellular Network 284  Jyh-Shyan Huang* and Yao-Nan Lien** (*Chunghwa Telecom Laboratories, Taipei, Taiwan, **National Asia University, Taipei, Taiwan)
1-20	Dynamic Reordering Bloom Filter 288 Da-Chung Chang, Chien Chen, and Mahadevan Thanavel (National Chiao Tung University, Hsinchu, Taiwan)
1-21	Sliced NFV Service Chaining in Mobile Edge Clouds 292 Sooeun Song and Jong-Moon Chung (Yonsei University, Seoul, Korea)
1-22	Forwarding Path Discovery with Software Defined Networking 299 Chih-Chieh Chen*, Yi-Ren Chen*†, Shi-Chun Tsai*, and Ming-Chuan Yang† (*National Chiao Tung University, Hsinchu, Taiwan, †Academia Sinica, Taipei, Taiwan)
1-23	FERA: A Caching Scheme in CCN using File-Extension and Regression Analysis 303  Jin Won Lee and Choong Seon Hong (Kyung Hee University, Korea)
1-24	iToy: A LEGO-like Solution for Small Scale IoT Applications 307 Yi Ren, Muhammad Alfiansyah, Nyoto Arif Wibowo, Cheng-Wei Wu, JieFu Geng, and Yu-Chee Tseng (National Chiao Tung University, Hsinchu, Taiwan)
1-25	A3N: Agile Application-Awareness in Software-Defined Networks 311  He Cai, Jun Deng*, Yuhua Zhang*, and Xiaofei Wang*, Sangheon Pack** (*Tianjin University, Tianjin, China, **Korea University, Seoul, Korea)

	<b>r Session 2</b> Fri. Sep. 29, 10:00~10:30(30 min)/ 14:50~15:20(30 min), Lobby Chair: Prof. Hong-Taek Ju (Keimyung University, Korea)	
2-1	Application-aware Traffic Engineering in Software-Defined Network 315 Seyeon Jeong, Doyoung Lee, Jonghwan Hyun, Jian Li, and James Won-Ki Hong (POSTECH, Pohang, Korea)	
2-2	Reliable Vehicle Selection Algorithm with Dynamic Mobility of Vehicle in Vehicular Cloud System 31 Sukjin Choo, Insun Jang, Jungwoo Koo, Joonwoo Kim, and Sangheon Pack (Korea University, Seoul, Korea)	19
2-3	Performance Analysis of H.264, H.265, VP9 and AV1 Video Encoders 322 Md Abu Layek, Ngo Quang Thai, Md Alamgir Hossain, Ngo Thien Thu, Le Pham Tuyen, Ashis Talukder, TaeChoong Chung and Eui-Nam Huh (Kyung Hee University, Korea)	
2-4	Structured Whitelist Generation in SCADA Network using PrefixSpan Algorithm 326 Woo-Suk Jung*, Jeong-Han Yun**, Sin-Kyu Kim**, Kyu-Seok Shim*, and Myung-Sup Kim (*Korea University, Sejong, Korea, **National Security Research Institute, Daejeon, Korea)	

2-5	Enhancing Service Resiliency in the Next Generation EPC System 330  Zaw Htike and Yoshinori Kitatsuji (KDDI Research Inc., Japan)
2-6	Parallel and Local Diagnostic Algorithm for Wireless Sensor Networks 334 Lidan Wang*, Xiaofei Zhang*, Yu-Chee Tsengy**, and Cheng-Kuan Lin* (*Soochow University, Suzhou, China, **National Chiao-Tung University, Hsinchu, Taiwan)
2-7	A Hybrid Live Streaming Model for a Reliable Service 338  Dongho Son, Doyoung Lee, Taeyeol Jeong, and James Won-Ki Hong (POSTECH, Pohang, Korea)
2-8	User Clustering based on Correlation in 5G using Semidefinite Programming 342 Chit Wutyee Zaw, Yan Kyaw Tun, and Choong Seon Hong (Kyung Hee University, Korea)
2-9	Downlink Power Allocation in Virtualized Wireless Networks 346 Yan Kyaw Tun, Chit Wutyee Zaw, and Choong Seon Hong (Kyung Hee University, Korea)
2-10	SigManager: Automatic Payload Signature Management System for the Classification of Dynamically Changing Internet Applications 350  Kyu-Seok Shim*, Young-Hoon Goo*, Sungyun Kim**, Mi-Jung Choi**, and Myung-Sup Kim* (*Korea University, Sejong, Korea, **Kangwon National University, Chuncheon, Korea)
2-11	An Approach of Cost Optimized Influence Maximization in Social Networks 354 Ashis Talukder, Md. Golam Rabiul Alam, Anupam Kumar Bairagi, Sarder Fakhrul Abedin, Md Abu Layek, Hoang T. Nguyen, and Choong Seon Hong (Kyung Hee University, Korea)
2-12	Browser's "search form" issues and countermeasures 358 Yuji Suga (Internet Initiative Japan Inc., Japan)
2-13	Access Point Selection Algorithm for Providing Optimal AP in SDN-based Wireless Network 362 DongKyu Lee and Choong Seon Hong (Kyung Hee University, Korea)
2-14	Collaborative Cache Allocation and Computation Offloading in Mobile Edge Computing 366  Anselme Ndikumana, Saeed Ullah, Tuan LeAnh, Nguyen H. Tran, and Choong Seon Hong (Kyung Hee University, Korea)
2-15	Infrastructure-assisted Hybrid Road-aware Routing and QoS Provisioning in VANETs 370  Muhammad Tahir Abbas and Wang-Cheol Song (Jeju National University, Jeju, Korea)
2-16	Mobile charger billing system using lightweight Blockchain 374 Nam Ho Kim, Sun Moo Kang, and Choong Seon Hong (Kyung Hee University, Korea)
2-17	Reliable Smart Energy IoT-Cloud Service Operation with Container Orchestration 378 Seungryong Kim, Chorwon Kim, and JongWon Kim (Gwangju Institute of Science and Technology, Gwangju, Korea)
2-18	Probabilistic k-Weighted Coverage Placement in Wireless Sensor Networks 382 Guey-Yun Chang*, Chih-Wei Charng*, Jang-Ping Sheu**, and Liang Ruei-Yuan* (*National Central University, Jhongli, Taiwan, **National Tsing Hua University, Hsinchu, Taiwan)
2-19	A Traffic Grouping Method using the Correlation Model of Network Flow 386 Young-Hoon Goo*, Sung-Ho Lee*, Seongyun Choi**, Mi-Jung Choi**, and Myung-Sup Kim* (*Korea University, Sejong, Korea, **Kangwon National University, Chuncheon, Korea)
2-20	Classification of Application Traffic Using Tensorflow Machine Learning 391  Jee-Tae Park, Kyu-Seok Shim, Sung-Ho Lee, and Myung-Sup Kim (Korea University, Sejong, Korea)
2-21	Power Allocation Games for Cooperative Coordinated Multipoint Transmission Scheme 395 Seunghyun Jung and Hyunggon Park (Ewha Womans University, Seoul, Korea)
2-22	Information Fusion based Agile Streaming Telemetry for Intelligent Traffic Analytics of Softwarized Network 399  Taesang Choi, Sangsik Yoon, and Sejun Song (ETRI, Daejeon, Korea)

2-23	An Ontology-based Hybrid Approach for Accurate Context Reasoning 403  Muhammad Asif Razzaq, Muhammad Bilal Amin and Sungyoung Lee (Kyung Hee University, Korea)
2-24	Application Identification System for SDN QoS based on Machine Learning and DNS Responses 407 Nen-Fu Huang*, Che-Chuan Li*, Chi-Hsuan Li*, Chia-Chi Chen*, Ching-Hsuan Chen**, and I-Hsien Hsu* (*National Tsing Hua University, Hsinchu, Taiwan, **National Tsing Hua University, Hsinchu, Taiwan)
2-25	The Unique Reliable Identity System of Enabling Lightweight Device Management in NMS Mechanism for the U-loT 411 Khamdamboy Urunov, Soo-Young Shin, and Soo-Hyun Park (Kookmin University, Seoul, Korea)