2020 International Conference on Computing, Networking and Communications (ICNC 2020)

Big Island, Hawaii, USA 17-20 February 2020

Pages 1-530



IEEE Catalog Number: ISBN: CFP2059R-POD 978-1-7281-4906-6

Copyright © 2020 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:	
ISBN (Print-On-Demand):	
ISBN (Online):	
ISSN:	

CFP2059R-POD 978-1-7281-4906-6 978-1-7281-4905-9 2325-2626

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



Program

Monday, February 17

Monday, February 17 8:30 - 9:30

Keynote Talk I: Solving the Blockchain Trilemma

David Tse, Thomas Kailath and Guanghan Xu Professor, Stanford University, USA

Rooms: Keauhou II, Keauhou III, Keauhou IV, Mauna Kea, Mauna Loa

Chair: Cheng Li

Abstract: The blockchain trilemma is a conjecture which states that it is impossible to build a fully decentralized blockchain system whose security and transaction throughput both scale linearly with the number of nodes in the network. We provide a resolution to the conjecture.

Monday, February 17 9:30 - 10:00

Coffee Break

Monday, February 17 10:00 - 12:00

Distinguished Lecture I: Towards Provisioning Vehicle-Based Information Services

Hassam Hassanein, Queen's University, Canada

Room: Keauhou II Chair: Yuanzhu Chen

CNC I

Room: Keauhou III Chair: Ali M. S. Alfosool

- Zero-forcing beamforming with user grouping in spatially correlated channel environments...1 Geon-Woong Jung, Hyoung-Keon Kim and Yong-Hwan Lee
- Flicker Mitigation and Dimming Control Analyze of Duty Cycle Fixed-MVPM for Indoor VLC System...6 Shengyang He, Guanghui Ren, Longwen Wu, Yaqin Zhao and Zhe Sun
- **Performance Evaluation of In-network Packet Retransmissions using Markov Chains...10** Runa Barik, Michael Welzl, Peyman Teymoori, <u>Safiqul Islam</u> and Stein Gjessing
- Metrics to Meet Security & Privacy Requirements with Agile Software Development Methods in a Regulated Environment..17 Torrey Wagner and Thomas Ford

Chinese Landmark Recognition...24

Hao Wu and Min Chen

Optimal Stochastic Media Storage in Federated Cloud Environments...29 <u>Xiao Su</u>, Zhenzhen Ye, Lingshuang Wu and Yi Shang

Precoders and Equalizers for Spatially Correlated Antennas in Single-Carrier Massive MIMO Transmission...35 Nader Beigiparast and Ender Ayanoglu

CNC II

Room: Keauhou IV

- Blackmailer or Consumer? A Character-level CNN Approach for Identifying Malicious Complaint Behaviors...41 Zipei Li, Qianqian Huang, Chengqi Yi, Huiying Li, Mingjun Guo and Jiandong Wang
- The Human Visual System Based Color QR Codes...46 Min-Jen Tsai and Chin-Yu Hsieh
- Virtual Reality in Health Care...51 Himanshu Ajmera and <u>Bilal Gonen</u>
- *A New Fast Algorithm for Finding Capacity of Discrete Memoryless Thresholding Channels...56* Thuan Nguyen, Yu Jung Chu and Thinh Nguyen
- A Survey on IETF Standardization for Connecting and Integrating the Low-Power and Constrained IoT Devices...61 Lijun Dong
- **Queuing Analysis for Content Placement and Request Scheduling in Data Center...68** Lijun Dong
- Minimize Cost of Data Transfers Using Bandwidth Reservation on FPVB Paths of Dynamic HPNs...74 Liudong Zuo and Michelle M. Zhu

CNC III

Room: Mauna Kea

Chair: Jamil Y Khan

- **Coarse-to-fine Grained Image Splicing Localization Method Based on Noise Level Inconsistency...79** Xiaofeng Wang, Qian Zhang, Chuntao Jiang and Ying Zhang
- High Throughput and QoE Fairness Algorithms for HD Video Transmission over IEEE802.11ac Networks...84 Summera Nosheen and Jamil Y Khan
- **Environment Sensing Based on Non-Geotagged Sensor Data...90** Shigeo Shioda and Yuto Ohashi
- Single Carrier Transmission in Massive MIMO Revisited...96 Arman Farhang, Amir Aminjavaheri and Behrouz Farhang-Boroujeny
- Comparison of Latency with Selective Repeat and Rateless Coding in Delayed Feedback Systems...102 <u>Matthew Johnson</u> and Willie K Harrison
- Abnormal Activity Detection in Edge Computing: A Transfer Learning Approach...107 Yiyun Zhou, Meng Han, Jing (Selena) He, Liyuan Liu, Xiaohua Xu and Xi Gao
- *Efficient Data Advertisement in Information Centric Disruption Tolerant Networks...112* Katherine Russell and Robert Simon

CNC IV

Room: Mauna Loa

Chair: Behrouz Farhang-Boroujeny

Towards Adaptive Packet Scheduler with Deep-Q Reinforcement Learning...118 Qiwei Wang, <u>Thinh Nguyen</u> and Bella Bose Low Complexity Beam Selection Scheme for High Speed Railway Communications...124 Jiaqi Zhao, Rui Jiang and Youyun Xu

Resource Allocation Mechanism with the Base Station Assistance in New Radio-Vehicle...129 Ye Wang, Xinyu Gu, Hao Wang, Zeyang Zhang, Yi Gong and Lin Zhang

Towards Derivation of Exact Closed-Form Expressions for the Distribution and Bit Error Probability of Binary Modulation over Composite Shadowed Fading Channels...134

Mohammed Aloqlah

Online Economic Dispatch with Volatile Renewable Generation and Ramping Costs...139 Joshua Comden, Jessica Maghakian and Zhenhua Liu

Improving Efficiency in Attack Detection through Real-time Processing Monitoring and Machine Learning...145 Danai Chasaki and Christopher Mansour

A weighting system for building RSS maps by crowdsourcing data from smartphones...152 Hosam Alamleh, Ali Abdullah S. AlQahtani, Jean Gourd and Hatwib Mugasa

Monday, February 17 12:00 - 13:30

Lunch (on attendee own)

Monday, February 17 13:30 - 15:30

Distinguished Lecture II: Technology Trends for Connected and Autonomous Electric Vehicles in Smart Cities

Hussein T. Mouftah, University Distinguished Professor, Ottawa University, Canada

Room: Keauhou II Chair: Chin-Tser Huang

CNC V

Room: Keauhou III Chair: A. Malik Aljalai

On Finding Hidden Relationship among Variables in WiFi using Machine Learning...157 Aizaz U Chaudhry and Roshdy H Hafez

- **Overlapping Histograms for 3D Data Classification...162** Yuyu Lai, Ryan Norfield, Alexander Micsoniu, Raziq Khan and Michal Aibin
- **On advantages of data driven traffic classification for dynamic routing in optical networks...166** Edyta Biernacka and Michal Aibin
- *Time-Varying Truth Prediction in Social Networks Using Online Learning...171* Olusola Tolulope Odeyomi, Hyuck Kwon and David Murrell

RESTful Web of Things for Ubiquitous Smart Home Energy Management...176 Bhagya Silva, Murad Khan, Kyuchang Lee, <u>Yongtak Yoon</u>, Muhammad Diyan, Jihun Han and Ki Jun Han

IP Reputation Analysis of Public Databases and Machine Learning Techniques...181 Jared Lewis, Geanina Tambaliuc, <u>Husnu S Narman</u> and Wook-Sung Yoo Impacts of Positive and Negative Comments of Social Media Users to Cryptocurrency...187 Husnu S Narman and Alymbek Damir Uulu

CNC VI

Room: Keauhou IV

Chair: Bilal Gonen

An Improved Real-time Video Stream Differentiated Transmission Algorithm Based on IDNC...193 Weixia Zou

Dual-Hop Wireless Powered Communication Networks Assisted by Backscatter...198 Meihua Liu, Rui Jiang and Youyun Xu

Service Restoration in Multi-Modal Optical Transport Networks with Reinforcement Learning...204 Zipiao Zhao, Yongli Zhao, Yajie Li, Ying Wang, Sabidur Rahman, Dongmei Liu and Jie Zhang

Automated Event Identification from System Logs Using Natural Language Processing...209 Abhishek Dwaraki, Shachi Kumar and Tilman Wolf

A Game Theoretic Model for Deadline Constrained Packet Scheduling with an Energy Harvesting Jammer...216 Haseen Rahman, Ankith Vinayachandran, Sibi Raj B Pillai, Kumar Appaiah and Rahul Vaze

Physical Layer Security in Frequency-Domain Time-Reversal SISO OFDM Communication...222 Sidney Jonathan Golstein, François Horlin, Trung-Hien Nguyen, Philippe De Doncker and Julien Sarrazin

Evaluating Methods for Enabling Continuous Operation in Dynamic WiFi Direct Networks...228 Aaron Faulkenberry, <u>Utku Demir</u>, Cristiano Tapparello and Wendi Heinzelman

CNC VII

Room: Mauna Kea

Chair: Vanlin Sathya

- An EV Charging Station Placement for Ride-hailing Service: from Big Data Networking Perspective...235 Yulan Yuan, Konglin Zhu, Lin Zhang and Yuming GE
- SmartNavi: A Smart Navigation Application with Main and Auxiliary Distinguishing Using Deep Learning Approach..240 Wentao Chen, Konglin Zhu, Lin Zhang and Yuming GE
- A Power Allocation Scheme Based on Deep Reinforcement Learning in HetNets...245 Qingyong Su, Bin Li, <u>Chaowei Wang</u>, Cai Qin and Weidong Wang
- An Anti-sniffing Protocol for Location-based Services in Wireless Networks...251 Xingya Liu and Greg Yera

Combating TCP Port Scan Attacks Using Sequential Neural Networks...256 Bruce Hartpence and Andres Kwasinski

Fair Scheduling for Deadline-Driven, Resource-Constrained, Multi-Analytics Workloads...261 <u>Stratos Dimopoulos</u>, Chandra Krintz and Rich Wolski

Routing and wavelength allocation in spatial division multiplexing based quantum key distribution optical networks...268

Shufeng Li, Xiaosong Yu, Yongli Zhao, Hua Wang, Xiaotian Zhou and Jie Zhang

Distinguished Lecture III: Localization of Things

Moe Win, Professor, MIT, USA

Room: Mauna Loa Chair: Cheng Li

Monday, February 17 16:00 - 18:00

CNC VIII

Room: Keauhou II

Chair: Bruce Hartpence

An Approach for Authoring Mulsemedia Documents Based on Events...273 Douglas Paulo de Mattos, Debora Muchaluat-Saade and Gheorghita Ghinea

Biased Estimation For Source Localization in Fault Tolerant Networks...278 Lauren Huie and Mark Fowler

Time-Varying Diffusion Social Learning...282

Vidhi Rana, Hyuck Kwon and David Murrell

Deep Learning Based Identification of Wireless Protocols in the PHY layer...287 Alex Berian, Irmak Aykin, Marwan Krunz and Tamal Bose

Machine-Learning-based Alarm Prediction with GANs-based Self-Optimizing Data Augmentation in Large-Scale Optical Transport Networks...294

Haotao Zhuang, Yongli Zhao, Xiaosong Yu, Yajie Li, Ying Wang and Jie Zhang

Unsupervised Protocol-based Intrusion Detection for Real-world Networks...299 Maxime Labonne, Alexis Olivereau, Baptiste Polvé and Djamal Zeghlache

Multi-UAV Cooperative Mission Assignment Algorithm Based on ACO method...304

Yibing Li, Sitong Zhang, Jie Chen, Tao Jiang and Fang Ye

CNC IX

Room: Keauhou IV

Chair: A. Malik Aljalai

An Intelligent System for Rumor Recognition and Rumor Sentiment Judgment...309 Jun Wang, Xing Liu, Ali M. S. Alfosool, Junjie Su, Xirui Fu and Jinghua Tan

Physical-Layer Security with Finite Blocklength over Slow Fading Channels...314 Tong-Xing Zheng, Hao-Wen Liu, Zhaowei Wang, Qian Yang and Hui-Ming Wang

An Improved BBU/RRU Energy Consumption Predictor for 4G and Legacy Mobile Networks using Mixed Statistical Models...320 David Duarte, Thaína C. Saraiva, Iola Pinto and Pedro Vieira

Spread Spectrum Technique Using Staggered Multi-tone...326 Austin Stevens, Behrouz Farhang-Boroujeny, Hussein Moradi, Jonathan Driggs and Taylor Sibbett

Adaptive Directional Neighbor Discovery Schemes in Wireless Networks...332 El khamlichi Btissam, El abbadi Jamal, Nathaniel W Rowe and Sunil Kumar

A Deep Learning Based Channel Estimation for High Mobility Vehicular Communications...338 Mehrtash Mehrabi, Mostafa Mohammadkarimi, Masoud Ardakani and Yindi Jing

A SNR-based PSO Cooperative Spectrum Sensing Algorithm against Malicious Nodes...343

Fang Ye, Zitao Zhou, Ping Bai, Yansong Wang and Tao Jiang

CNC X

Room: Mauna Kea

MIMO-OFDM Detector Selection using Reinforcement Learning....347 Hyukjoon Kwon and Kee-Bong Song

- **Towards Aol-aware Smart IoT Systems...353** Hasan Beytur, Sajjad Baghaee and Elif Uysal
- Data Migration in Large Scale Heterogeneous Storage Systems with Space Constraints...358 Sixia Chen, Chadi Kari and Matthew Coolbeth
- Deep Adaptive Transmission for Internet of Vehicles (IoV)...363 Mehrtash Mehrabi, Mostafa Mohammadkarimi, Masoud Ardakani and Yindi Jing
- *Meeting Users' QoS in a Edge-to-Cloud Platform via Optimally Placing Services and Scheduling Tasks...368* Matthew Turner and Hana Khamfroush
- Analysis of Criteria for the Selection of Machine Learning Frameworks...373 Kai Dinghofer and Frank Hartung
- *Interference Resource Allocation Models for Communication Equipment...378* Yibing Li, Xiaoyu Geng, Wei Lv, Han Yu, Fang Ye and Tao Jiang

Tuesday, February 18

Tuesday, February 18 8:20 - 8:30

Opening Ceremony

Room: Keauhou II

Tuesday, February 18 8:30 - 9:30

Keynote Talk II: Challenges and Opportunities in Algorithmic Solutions for Re-Balancing in Bike Sharing Systems

Jie Wu, Temple University

Room: Keauhou II Chair: Jian Ren

Abstract:

Tuesday, February 18 10:00 - 12:00

Invited Talks I: Wireless Communications/Networks

Ender Ayanoglu, Michele Zorzi, Marco Ajmone Marsan, Rose Hu

Room: Keauhou II

Satellite Communication at Millimeter Waves: a Key Enabler of the 6G Era...383

Marco Giordani and Michele Zorzi

CIS I:

Room: Keauhou IV

Chair: Christopher Mansour

Anonymous and Coercion-Resistant Distributed Electronic Voting...389 Ehab Zaghloul, Tongtong Li and Jian Ren

Secure and Efficient OFDM System Design under Disguised Jamming...394 Yuan Liang, Jian Ren and Tongtong Li

Malicious Message Detection on Twitter via Dissemination Paths...400 Charles A Tuttle, Savankumar Patel and Hao Yue

Defeating Jamming Attacks with Ambient Backscatter Communications...405

Huynh Van Nguyen, Diep N. Nguyen, Hoang Thai Dinh, Eryk Dutkiewicz, Markus Dominik Mueck and Srikathyayani Srikanteswara

Tackling Energy Theft in Smart Grids through Data-driven Analysis...410

Anish Jindal, Alberto E. Schaeffer-Filho, Angelos K. Marnerides, Paul Smith, Andreas U. Mauthe and Lisandro Z Granville

On the Effectiveness of Intrusion Response Systems against Persistent Threats...415 Sharif Ullah, Sachin Shetty, Amin Hassanzadeh, Anup Nayak and Kamrul Hasan

CLD

Room: Mauna Kea

Chair: Sahar Hoteit

Real Traffic-Aware Scheduling of Computing Resources in Cloud-RAN...422 Hatem Ibn Khedher, Sahar Hoteit, Patrick Brown, Véronique Vèque, Ruby Krishnaswamy, William Diego and Makhlouf Hadji

Dynamic Time-Threshold Based Receive Buffer for Vehicle-to-Cloud Multipath Transmission...428 Yuyang Zhang, Ping Dong, Xiaojiang Du, Hongbin Luo, Hongke Zhang and Mohsen Guizani

QoS-enabled Cache Architecture for a Private Cloud...434

Taejoon Kim, Yu Gu and Jinoh Kim

A Deep Forest Method for Classifying E-Commerce Products by Using Title Information...440 Jin Dai, Tianyu Wang and Shaowei Wang

Harmonizing Wearable Biosensor Data Streams to Test Polydrug Detection...445 Joshua Rumbut, Hua Fang, Stephanie Carreiro, David Smelson, Brittany Chapman, Edward Boyer and Honggang Wang

Network Intrusion Detection System as a Service in OpenStack Cloud...450 Chen Xu, Ruipeng Zhang, Mengjun Xie and Li Yang

Invited Talks II

Li-Chun Wang, Yi Qian, Ling Liu and Tommaso Melodia

Room: Mauna Loa

Cross-Layer Strategic Ensemble Defense Against Adversarial Examples...456

Wenqi Wei, Ling Liu, Margaret Loper, Ka-Ho Chow, Mehmet Emre Gursoy, Stacey Truex and Yanzhao Wu

WN I

Room: Mauna Loa

Chair: A. Malik Aljalai

Air-Ground Cooperative Access Control Algorithm Based on Q-Learning...461

Qian Chen, Xiaolin He and Weixiao Meng

Joint Subcarrier-Pair and Power Allocation Based on SWIPT in Multi-Relay OFDM System...466 Weidang Lu, Liu Guangzhe, Peiyuan Si, Guoxing Huang, Bo Li and Yi Gong

Achieving Max-Min Throughput in LoRa Networks...471 Jiangbin Lyu, Dan Yu and Liqun Fu

Jiangbin Lyu, Dan Yu anu Liqun Fu

Energy Efficient NFV Resource Allocation in Edge Computing Environment...477 Xiao Chen

Link Scheduling in Wireless Powered Communication Networks...482 Ying Liu, Kwan-Wu Chin and <u>Changlin Yang</u>

Tuesday, February 18 13:30 - 15:30

Plenary: Ultra-dense Radio Access Network for 5G Advanced Systems Practicing the Art of Data Science

Fumiyuki Adachi, Specially Appointed Professor for Research, Tohoku University, Japan; Jian Pei, Canada Research Chair Professor, Simon Fraser University, Canada

Room: Keauhou II Chair: Shiwen Mao

Tuesday, February 18 16:00 - 18:00

Invited Talks III: Edge/Cloud Computing

Schahram Dustdar, Victor C.M. Leung, Ying-Dar Lin and Eiji Oki

Room: Keauhou II

Invited Talks IV:

Shiwen Mao, Luiz Da Silva, Xianbin Wang and Naoaki Yamanaka

Room: Keauhou III Chair: Yuanzhu Chen

CIS II:

Room: Keauhou IV

Chairs: Anish Jindal, Hyuck Kwon

Physical-layer security metric for user association in ultra-dense networks...487

Dania Marabissi, Lorenzo Mucchi and Simone Casini

- Anomaly Detection for Science DMZs Using System Performance Data...492 Ross Gegan, Christina Mao, Dipak Ghosal, Matt Bishop and Sean Peisert
- *Power Allocation Scheme for Physical-Layer Security of Two-Way Untrusted Relay in SCMA networks...497* Zhiqiang Li, Shuai Han and Xiao Wang

Honeypot Allocation over Attack Graphs in Cyber Deception Games...502 Ahmed H. Anwar Hemida, Charles A Kamhoua and Nandi Leslie

- Energy Efficient Artificial Noise-Aided Precoding Design for Visible Light Communication Systems...507 Thanh Pham and Anh T. Pham
- Assessing Security and Dependability of a Network System Susceptible to Lateral Movement Attacks...513 Hongyue Kang, Bo Liu, Jelena Mišić, Vojislav B. Mišić and Xiaolin Chang

CQSM

Room: Mauna Kea

Chair: Safiqul Islam

- Follow the Model: How Recursive Networking Can Solve the Internet's Congestion Control Problems...518 Michael Welzl, Peyman Teymoori, Stein Gjessing and Safiqul Islam
- Joint Power Allocation over Two-Hop Wireless Relay Systems Under Target Delay-Outage Constraints...525 Zhiqiang Xiong, Yu Chen, <u>Qimei Cui</u> and Xiaofeng Tao
- Backup Network Design Considering Primary and Backup Routing for Multiple Link Failures under Uncertain Traffic Demands...531

Soudalin Khouangvichit, Nattapong Kitsuwan and Eiji Oki

- Resilience Analysis of Software-Defined Networks Using Queueing Networks...536 Livinus O Nweke and Stephen Wolthusen
- *Multi-Objective Learning for Efficient Content Caching for Mobile Edge Networks...543* Te Chen, Binhong Dong, Yantao Chen, Yang Du and Shaoqian Li
- **CEO: Cost-Aware Energy Efficient Mobile Data Offloading via Opportunistic Communication...548** Chen Yang and Radu Stoleru

WN II

Room: Mauna Loa Chair: Vanlin Sathya

- *A Time-varying Filtering Algorithm based on Short-time Fractional Fourier Transform...555* Longwen Wu, Yaqin Zhao, Liang He, Shengyang He and Guanghui Ren
- *Energy Efficiency Optimization for UAV Swarm-Enabled Aerial Small Cell Networks...561* Chengxiao Liu, Wei Feng, Yukui Pei, Jue Wang, Yunfei Chen and Ning Ge
- **Evolutionary Search for Energy-Efficient Distributed Cooperative Spectrum Sensing...567** He Jiang, Lusi Li, Haibo He and Lingjia Liu
- **On the Feasibility of High Throughput mmWave Backhaul Networks in Urban Areas...572** Qiang Hu and Douglas Blough

Optimal Path Construction with Decode and Forward Relays in mmWave Backhaul Networks...579

Yan Yan, Qiang Hu and Douglas Blough

Partial Signature for Cooperative Intelligent Transport Systems...586

Hacene Fouchal and Alain Ninet

Tuesday, February 18 19:00 - 21:00

Welcome Reception

Room: Waikiki Ballroom Terrace

Wednesday, February 19

Wednesday, February 19 8:30 - 9:30

Keynote III: Security of 4G and 5G cellular networks

Elisa Bertino, Purdue University, USA

Room: Keauhou II Chair: Hossam S. Hassanein

Wednesday, February 19 10:00 - 12:00

Industry Forum I

AI for Future Communication Networks and Services Jin Yang, Irena Atov, Sumei Sun, Ying Li and Haris Gacanin

Room: Keauhou II

Wednesday, February 19 10:00 - 11:00

Keynote Talk IV: Safe Learning in Robotics

Claire Tomlin, Desoer Professor, UC Berkeley, USA.

Room: Keauhou II Chair: Yuanzhu Chen

Wednesday, February 19 13:30 - 15:30

Plenary: Machine Learning Techniques for Fast Protocol Adaptation in Wireless Networks Federated Learning: Challenges and Opportunities

Marwan Krunz, Kenneth VonBehren Endowed Professor, The University of Arizona, USA; Baochun Li, Bell Canada Endowed Chair Professor, University of Toronto, Canada

Room: Keauhou II Chair: Yuanzhu Chen

Wednesday, February 19 16:00 - 18:00

Industry Forum II

Masahito Togami, Akihiko K. Sugiyama, Yotaro Kubo, Suresh Babu Kolla and Haohong Wang

Room: Keauhou II

Invited Talks V:

Zhu Han, Jelena Misic, Jie Wang and Hamid Sharif

Room: Keauhou III Chair: Cheng Li

MLCN I

Room: Keauhou IV

Chair: Ahmed Attia Abotabl

Predictive Caching for AR/VR Experiences in a Household Scenario...591 Sharare Zehtabian, Mina Razghandi, Ladislau Bölöni and Damla Turgut

Machine Learning based detection of multiple Wi-Fi BSSs for LTE-U CSAT...596 Vanlin Sathya, Adam Dziedzic, Monisha Ghosh and Sanjay Krishnan

Scheduling the Data Transmission Interval in IEEE 802.11ad: A Reinforcement Learning Approach...602 Tommy Azzino, Tanguy Ropitault and Michele Zorzi

Reliable and Low-Complexity MIMO Detector Selection using Neural Network...608 Shailesh Chaudhari, Hyukjoon Kwon and Kee-Bong Song

Learning PHY Layer Parameters via SNR-Value Network...614 Ahmed Attia Abotabl, Jung Hyun Bae and Kee-Bong Song

ISA

Room: Mauna Kea Chair: Prasad Calyam

Distributed Task Scheduling in Heterogeneous Fog Networks: A Matching with Externalities Method...620 Zening Liu, Kunlun Wang, Ming-Tuo Zhou, Ziyu Shao and Yang Yang

Real-time Wireless Health Monitoring: An Ultra-low Power Biosensor Ring for Heart Disease Monitoring...626 Md Shaad Mahmud, Brian Coffen and Patrick Scott

Joint Scheduling and Power Allocation for 6G Terahertz Mesh Networks...631 Mengxin Yu, <u>Aimin Tang</u>, Xudong Wang and Chong Han

Smart Antenna Allocation for Wireless Surveillance...636 Shiyu Chen, Zhi Chen, Lingxiang Li and Shaoqian Li

Energy-aware Dynamic Computation Offloading for Video Analytics in Multi-UAV Systems...641 Aditya Vandanapu, Jeromy Yu, Chengyi Qu, Songjie Wang and Prasad Calyam

A Proximity-Based Generative Model for Online Social Network Topologies...648 Emory C Hufbauer, Nathaniel Hudson and Hana Khamfroush Chair: Jamil Y Khan

LoRa vs. WiFi Ad Hoc: A Performance Analysis and Comparison...654 George Klimiashvili, <u>Cristiano Tapparello</u> and Wendi Heinzelman

Performance Evaluation of WiFi Direct Multi Hop Ad-Hoc Networks...661 Nadir Adam, <u>Cristiano Tapparello</u> and Wendi Heinzelman

Coverage Analysis of Random UAV Networks Using Percolation Theory...667 MD Nashid Anjum, Honggang Wang and Hua Fang

Peer-to-Peer Energy Trading and Grid Impact Studies in Smart Communities...674 Eric Elliott, Nicholas Shanklin, Sharare Zehtabian, Qun Zhou and Damla Turgut

Reversing The Meaning of Node Connectivity for Content Placement in Networks of Caches...679 Junaid Ahmed Khan, Cedric Westphal, JJ Garcia-Luna-Aceves and Yacine Ghamri-Doudane

Modeling of Churn Process in Bitcoin Network...686 Saeideh Motlagh, Jelena Mišić and Vojislav B. Mišić

Wednesday, February 19 19:00 - 21:00

Banquet & Award Ceremony

Room: Pualeilani Terrace

Thursday, February 20

Thursday, February 20 8:30 - 9:30

Keynote V: Reinforcement Learning for Resource Management in Space-Air-Ground (SAG) Integrated Vehicular Networks

Xuemin (Sherman) Shen, University Professor, University of Waterloo, Canada

Room: Keauhou II Chair: Jelena Mišić

Thursday, February 20 10:00 - 12:00

Distinguished Lecture IV: New Algorithms Enabling On-Demand Dynamic Spectrum Allocation

Min Song, Professor and Chair, Stevens Institute of Technology, USA

Room: Keauhou II Chair: Vojislav B. Mišić

Invited Talks VI

Zhizhang Chen, Falko Dressler, Hui Li and Yonggang Wen

Room: Keauhou III

Integrating Haptic Signals with V2X-based Safety Systems for Vulnerable Road Users...692 Marie-Christin H. Oczko, Lukas Stratmann, Mario Franke, Julian Heinovski, Dominik S. Buse, Florian Klingler and Falko Dressler

MLCN II

Room: Keauhou IV

Chair: Yusun Chang

- Intelligent Tracking of Network Dynamics for Cross-Technology Coexistence Over Unlicensed Bands...698 Mohammed Hirzallah and Marwan Krunz
- Non-cooperative OFDM Spectrum Sensing Using Deep Learning...704 Qingqing Cheng, Zhenguo Shi, Diep N. Nguyen and Eryk Dutkiewicz
- Data Resolution Improvement for Ocean of Things Based on Improved FCM...709 Jiachen Yang, Jiabao Wen, Bin Jiang, Houbing Song, Fanhui Kong and Zhizhuo Zhen
- A Comparison of Machine and Statistical Time Series Learning for Encrypted Traffic Prediction...714 Qing He, <u>Georgios P. Koudouridis</u> and György Dán
- **Examining Permission Patterns in Android Apps using Kernel Density Estimation...719** Muhammad Saleem, Jelena Mišić and Vojislav B. Mišić
- **CKCD: A Fair and Low Latency Queue Control Algorithm for Heterogeneous TCP Flows...725** Qiong Liu, Peng Yang, Ming Yang and Li Yu

GCNC

Room: Mauna Kea

Chair: Ali M. S. Alfosool

- *Improving the Energy Efficiency of DFT-s-OFDM in Uplink Massive MIMO with Barker Codes (Invited Paper)...731* A. Malik Aljalai, Chen Feng, Victor C.M. Leung and Rabab Ward
- Data driven fault tolerant thermal management of data centers...736 Masoud Kheradmandi and Douglas Down
- *A Linear FMCW Radar System for Accurate Indoor Localization and Trajectory Detection...741* Zhizhang (David) Chen, Rongpeng Xiong, Xinxin Feng and Haifeng Zheng
- Shaping Energy Beamforming to the Nonlinearity of Energy Harvesting Devices...746 Ali Bayat and Sonia Aissa
- A Network of Cooperative Routers to Distribute Live Multimedia Content over the Internet...751 Leandro M Sales, Wendell S Soares, Rafael Silva, Karan Verma and Eduardo Setton
- **Rateless Adaptation for Mobile Visible Light Communications...757** Dianhan Xie, Chao Xu, Aimin Tang and Xudong Wang

SPC I

Room: Mauna Loa

A Error Recovery MIMO Detection Algorithm based on Lattice Reduction...762 Wenxiu Wu, Jia Hou and Xueqin Jiang

Federated Learning Based Mobile Edge Computing for Augmented Reality Applications...767 Dawei Chen, Linda Jiang Xie, BaekGyu Kim, Li Wang, Choong Seon Hong, Li-Chun Wang and Zhu Han

A Novel Joint Scheduling Scheme of Earth Observation and Transmission in Satellite Networks...774 Peng Wang, Hongyan Li, Shun Zhang, Xiangyu Lin, Jun Liu and Erbao Wang **Optimal Resource Allocation in Point-to-Point Wireless Body Area Network with Backscatter Communication...780** Zhuang Ling, Fengye Hu and Li Dong

Price Control for Computational Offloading Services with Chaotic Data...785 Benedetta Picano, Romano Fantacci and Zhu Han

On Dually-Polarized MIMO based NOMA: System Model and Polarization Resource Allocation...791 Youquan Lin, Bin Cao, Xiaodong Lin and Qinyu Zhang

Thursday, February 20 13:30 - 15:30

Invited Talks VII:

Panos Nasiopoulos, Abdulmotaleb El Saddik, Lee Swindlehurst and Manos M. Tentzeris

Room: Keauhou II

Chair: Falko Dressler

MCC

Room: Keauhou III Chair: Brian D Hayes

Live Video Streaming with Joint User Association and Caching Placement in Mobile Edge Computing...796 Wei-Yu Chen, Po-Yu Chou, Chih-Yu Wang, Ren-Hung Hwang and Wen-Tsuen Chen

Robust EEG-based Emotion Recognition using Multi-feature Joint Sparse Representation...802 Dapeng Wu, Xiaojuan Han, Honggang Wang and Ruyan Wang

UCRA: A User-Centric Context-Aware Resource Allocation for Network Slicing...808 Dapeng Wu, Zhigang Yang, Honggang Wang, Boran Yang and Ruyan Wang

Lightweight Evolving 360 VR Adaptive Video Delivery...815 Brian D Hayes and Yusun Chang

Latency Minimization for Computation Offloading with Hybrid Multiple Access Methods...820 Lina Liu, Bo Sun, Yuan Wu and Danny H.K. Tsang

Efficient Mobile Edge Computing with Different Memory Capacities for Mobile Internet of Things...826

Yi Zhu, Kevin Chevalier, Xi Wang, Paparao Palacharla, Nannan Wang and Tadashi Ikeuchi

SCSD I

Room: Keauhou IV

Chair: Margaret Loper

Time-Ordered Bipartite Graph for Spatio-Temporal Social Network Analysis...833 Shorouq Al-Eidi, Yuanzhu Chen, Omar Darwish and <u>Ali M. S. Alfosool</u>

The media-based corporate swarm on stock markets...839 Rong Xing, Qing Li, Jingmei Zhao and Jiwen Huang

Formation of a Community: in the Case of a Particular Non-profit Sports Organization...844 Qingxuan Zhou, Jia Yu and Weiqiang Sun

Analysis of Information Spread on SNSs Based on Strong Correlation Assumption...849 Shigeo Shioda and Masato Minamikawa

Road Importance Using Complex-Networks, Graph Reduction & Interpolation...855

Ali M. S. Alfosool, Yuanzhu Chen, Daniel Fuller and Shorouq Al-Eidi

WC I

Room: Mauna Kea

Outdoor mmWave Channel Propagation Models using Clustering Algorithms...860 Bogdan Antonescu, Miead Tehrani Moayyed and Stefano Basagni

Deep learning based likelihood ascent search detection algorithm for uplink multiuser Massive MIMO system...866 Lin Li and Weixiao Meng

UE-to-Network Relay Discovery in ProSe-enabled LTE Networks...871 Samantha Gamboa, Alexandre C Moreaux, David Griffith and Richard Rouil

Alternate Distributed Beamforming for Decode-and-Forward Multi-Relay Systems Using Buffers...878 Jiayu Zhou and Deli Qiao

Age-Optimal Two-Layer Coding over Fading Channels...885 Dongqing Li, Shaohua Wu, Libo Yang, Jian Jiao and Qinyu Zhang

Impact of Beamforming on Delay Spread in Wideband Millimeter-wave Systems...890 Berk Akgun, Marwan Krunz and David G Manzi

WC II

Room: Mauna Kea

Chair: Behrouz Farhang-Boroujeny

Underlay Spectrum Sharing for NOMA Relaying Networks: Outage Analysis...897 Sultangali Arzykulov, Galymzhan Nauryzbayev, Theodoros Tsiftsis, Behrouz Maham, Mohammad Hashmi and Khaled M. Rabie

Performance Analysis of Filter Bank Multicarrier Spread Spectrum with Biorthogonal Signaling...902 David Haab, Hussein Moradi, Tom Holschuh and Behrouz Farhang-Boroujeny

Performance Analysis of a Time-sharing Joint Radar-Communications Network...908 Ping Ren, Andrea Munari and Marina Petrova

- Hybrid Beamformer Codebook Design and Ordering for Compressive mmWave Channel Estimation...914 Junmo Sung and Brian L Evans
- Augmenting Cloud Connectivity with Opportunistic Networks for Rural Remote Patient Monitoring...920 <u>Esther Max-Onakpoya</u>, Oluwashina Madamori, Faren Grant, Robin Vanderpool, Ming-Yuan Chih, David Ahern, Eliah Aronoff-Spencer and Corey E Baker
- Dynamic Spectrum Access for Femtocell Networks: A Graph Neural Network Based Learning Approach...927 He Jiang, Haibo He and Lingjia Liu

SPC II

Room: Mauna Loa

Packet Routing Against Network Congestion: A Deep Multi-agent Reinforcement Learning Approach...932 Ruijin Ding, Yuwen Yang, Jun Liu, Hongyan Li and Feifei Gao

Deep Learning Method for Generalized Modulation Classification under Varying Noise Condition...938

Yu Wang, Guan Gui, Nan Zhao, Hao Huang, Miao Liu, Jinlong Sun, Haris Gacanin, Hikmet Sari and Fumiyuki Adachi

Energy-Focusing Window Based Power Leakage Elimination for Wideband mmWave Massive MIMO-OFDM Systems...944 Bolei Wang, Feifei Gao and Geoffrey Li

Approximative Matrix Inversion Based Linear Precoding for Massive MIMO Systems...950 Xiaowei Qiang, Yang Liu, Qingxia Feng, Jinhong Liu, Xueli Ren and Minglu Jin

Distributed ADMM with Synergetic Communication and Computation...956 Zhuojun Tian, Zhaoyang Zhang, Jiamei Yan and Jue Wang

Channel Modeling for UCA and URA Massive MIMO Systems...963 Xudong Cheng, Yejun He and Jian Qiao

Thursday, February 20 16:00 - 18:00

Invited Talks VIII:

Yu Cheng, Takehiro Moriya, Honggang Wang and Michele Zorzi

Room: Keauhou II

Chairs: Yuanzhu Chen, Honggang Wang

Scalable and Accurate Modeling of the Millimeter Wave Channel...969 Paolo Testolina, Mattia Lecci, Michele Polese, Marco Giordani and Michele Zorzi

WAHS

Room: Keauhou III

Chair: Yuanzhu Chen

Data Size Aware Forwarding in Opportunistic Mobile Networks...975

Xiao Chen

Design and Implementation of RAP - a Randomized Asynchronous Protocol for Data Aggregation in Wireless Sensor Networks...980

Dipak Ghosal, Jiahui Dai, Dmitry Degtyarev, Adrian Wang, Jingya Gao, Scott Burman and Kenneth W Zillig

- A Fuzzy Logic Reinforcement Learning-Based Routing Algorithm For Flying Ad Hoc Networks...987 Chenguang He, Suning Liu and Shuai Han
- Social-Trust and Power-Efficient Relay Selection for Device-to-Device Underlaying Distributed Shared Network...992 Mengyue Sun, Nan Bao, Jiakuo Zuo, Xixia Sun and Su Pan
- A Novel Floor Estimation Method in Cellular Networks Based on PCA and Adaboost...997 Lin Ma, Pengfei Huang, Yongliang Sun, Yubin Xu and Danyang Qin

Network Time Connectivity for Wireless Networks...1002 Baofeng Zhou and Mehmet Can Vuran

SCSD II

Room: Keauhou IV Chair: Ali M. S. Alfosool

Natural Language Processing Characterization of Recurring Calls in Public Security Services...1009

Nicollas Oliveira, Lucio Reis, Natalia Fernandes, Carlos Alberto Malcher Bastos, Dianne Medeiros and Diogo Mattos

Optimal Protocols for Remote Entanglement Distribution...1014

Wenhan Dai, Tianyi Peng and Moe Z. Win

Queuing Delay for Quantum Networks...1020 Wenhan Dai, Tianyi Peng and Moe Z. Win

Decentralized Bandwidth Allocation Framework for Energy-Efficiency and Fog Integration in PONs...1026 Ahmed Helmy and Amiya Nayak

Fast Neighbor Discovery in MEMS FSO Networks...1031 Michael Atakora and Harsha Chenji

SPC III

Room: Mauna Loa

- Low-Power Consumption Hybrid Precoding for Millimeter Wave MIMO Systems...1038 Yongqiang Hei
- **On Performance of Multiuser Underwater Wireless Optical Communication Systems...1042** Li Zhang, Yingjie Chen, Kai Zhang, Jinguo Quan, Zhide Li and Yuhan Dong
- Throughput Analysis of HPO-MIMO Uplink With π-Phase Detector...1047 Yi Gong, Shengchu Wang and Lin Zhang
- Versatile Compressive mmWave Hybrid Beamformer Codebook Design Framework...1052 Junmo Sung and Brian L Evans
- **On Polarization Dependent Equalization in 5G mmWave Systems...1058** Farah Arabian, Greg Nordin and Michael Rice
- Nash Bargaining Based Power Allocation and Relay Selection for Cooperative NOMA Aided Spectrum Sharing Systems...1063 Yujie Wen, Xiaotian Zhou, Fang Fang, Haixia Zhang and Dongfeng Yuan