

# **2020 IEEE/ACM 28th International Symposium on Quality of Service (IWQoS 2020)**

**Hang Zhou, China  
15 – 17 June 2020**



**IEEE Catalog Number: CFP20IWQ-POD  
ISBN: 978-1-7281-6888-3**

**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:	CFP20IWQ-POD
ISBN (Print-On-Demand):	978-1-7281-6888-3
ISBN (Online):	978-1-7281-6887-6
ISSN:	1548-615X

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# TABLE OF CONTENTS

DECIMETER-LEVEL WIFI TRACKING IN REAL-TIME.....	1
<i>Zheng Yang, Wei Gong</i>	
PQA-CNN: TOWARDS PERCEPTUAL QUALITY ASSURED SINGLE-IMAGE SUPER-RESOLUTION IN REMOTE SENSING.....	11
<i>Yang Zhang, Xiangyu Dong, Md Tahmid Rashid, Lanyu Shang, Jun Han, Daniel Zhang, Dong Wang</i>	
PREVENTING SPREAD OF SPAM TRANSACTIONS IN BLOCKCHAIN BY REPUTATION.....	21
<i>Jiarui Zhang, Yukun Cheng, Xiaotie Deng, Bo Wang, Jan Xie, Yuanyuan Yang, Mengqian Zhang</i>	
FINEDGE: A DYNAMIC COST-EFFICIENT EDGE RESOURCE MANAGEMENT PLATFORM FOR NFV NETWORK.....	27
<i>Miao Li, Qixia Zhang, Fangming Liu</i>	
INCENTIVE ASSIGNMENT IN POW AND POS HYBRID BLOCKCHAIN IN PERVASIVE EDGE ENVIRONMENTS.....	37
<i>Yaodong Huang, Yiming Zeng, Fan Ye, Yuanyuan Yang</i>	
SUPPORTING MULTI-DIMENSIONAL AND ARBITRARY NUMBERS OF RANKS FOR SOFTWARE PACKET SCHEDULING.....	47
<i>Jiaqi Zheng, Yanan Jiang, Bingchuan Tian, Huaping Zhou, Chen Tian, Guihai Chen, Wanchun Dou</i>	
EXPLOITING RATELESS CODES AND CROSS-LAYER OPTIMIZATION FOR LOW-POWER WIDE-AREA NETWORKS.....	57
<i>Gonglong Chen, Jiamei Lv, Wei Dong</i>	
A GENERAL APPROACH TO ROBUST QR CODES DECODING.....	66
<i>Jiamei Lv, Yuxuan Zhang, Wei Dong, Yi Gao, Chun Chen</i>	
UNCONTROLLED RANDOMNESS IN BLOCKCHAINS: COVERT BULLETIN BOARD FOR ILLICIT ACTIVITY.....	72
<i>Nasser Alsalami, Bingsheng Zhang</i>	
A DEEP REINFORCEMENT LEARNING APPROACH FOR ONLINE COMPUTATION OFFLOADING IN MOBILE EDGE COMPUTING.....	82
<i>Yameng Zhang, Tong Liu, Yanmin Zhu, Yuanyuan Yang</i>	
PFCROWD: PRIVACY-PRESERVING AND FEDERATED CROWDSOURCING FRAMEWORK BY USING BLOCKCHAIN.....	92
<i>Chen Zhang, Yu Guo, Hongwei Du, Xiaohua Jia</i>	
LOGSAYER: LOG PATTERN-DRIVEN CLOUD COMPONENT ANOMALY DIAGNOSIS WITH MACHINE LEARNING.....	102
<i>Pengpeng Zhou, Yang Wang, Zhenyu Li, Xin Wang, Gareth Tyson, Gaogang Xie</i>	
IMPROVING THE PATH PROGRAMMABILITY FOR SOFTWARE-DEFINED WANS UNDER MULTIPLE CONTROLLER FAILURES.....	112
<i>Zehua Guo, Songshi Dou, Wenchao Jiang</i>	

INCORPORATING INTRA-FLOW DEPENDENCIES AND INTER-FLOW CORRELATIONS FOR TRAFFIC MATRIX PREDICTION.....	122
<i>Kaihui Gao, Dan Li, Li Chen, Jinkun Geng, Fei Gui, Yang Cheng, Yue Gu</i>	
JOINT SWITCH-CONTROLLER ASSOCIATION AND CONTROL DEVOLUTION FOR SDN SYSTEMS: AN INTEGRATION OF ONLINE CONTROL AND ONLINE LEARNING .....	132
<i>Xi Huang, Yinxu Tang, Ziyu Shao, Yang Yang, Hong Xu</i>	
PE-HEALTH: ENABLING FULLY ENCRYPTED CNN FOR HEALTH MONITOR WITH OPTIMIZED COMMUNICATION.....	142
<i>Yang Liu, Yilong Yang, Zhuo Ma, Ximeng Liu, Zhuzhu Wang, Siqi Ma</i>	
BIODRAW: RELIABLE MULTI-FACTOR USER AUTHENTICATION WITH ONE SINGLE FINGER SWIPE.....	152
<i>Jianwei Liu, Xiang Zou, Jinsong Han, Feng Lin, Kui Ren</i>	
HIGH-QUALITY ACTIVITY-LEVEL VIDEO ADVERTISING .....	162
<i>Mu Yuan, Lan Zhang, Zhengtao Wu, Daren Zheng</i>	
LEVERAGING STRAGGLERS IN CODED COMPUTING WITH HETEROGENEOUS SERVERS .....	172
<i>Xiaodi Fan, Pedro Soto, Xiaomei Zhong, Dan Xi, Yan Wang, Jun Li</i>	
DEEPQOE: REAL-TIME MEASUREMENT OF VIDEO QOE FROM ENCRYPTED TRAFFIC WITH DEEP LEARNING .....	182
<i>Meng Shen, Jinpeng Zhang, Ke Xu, Liehuang Zhu, Jiangchuan Liu, Xiaojiang Du</i>	
TOWARDS THE CONSTRUCTION OF GLOBAL IPV6 HITLIST AND EFFICIENT PROBING OF IPV6 ADDRESS SPACE.....	192
<i>Guanglei Song, Lin He, Zhiliang Wang, Jiahai Yang, Tao Jin, Jieling Liu, Guo Li</i>	
DELAY-SENSITIVE COMPUTATION PARTITIONING FOR MOBILE AUGMENTED REALITY APPLICATIONS.....	202
<i>Chaokun Zhang, Rong Zheng, Yong Cui, Chenhe Li, Jianping Wu</i>	
MAG-BARCODE: MAGNET BARCODE SCANNING FOR INDOOR PEDESTRIAN TRACKING .....	212
<i>Zefan Ge, Lei Xie, Shuangquan Wang, Xinran Lu, Chuyu Wang, Gang Zhou, Sanglu Lu</i>	
MODELING AND ANALYZING LIVE STREAMING PERFORMANCE .....	222
<i>Tong Zhang, Fengyuan Ren, Bo Wang</i>	
5GACCESS: NASH Q-LEARNING BASED MULTI-SERVICE EDGE USERS ACCESS IN 5G HETEROGENEOUS NETWORKS.....	232
<i>Anqi Zhu, Songtao Guo, Mingfang Ma</i>	
GROUPCOACH: COMPRESSED SENSING BASED GROUP ACTIVITY MONITORING AND CORRECTION .....	242
<i>Yutong Liu, Linghe Kong, Fan Wu, Guihai Chen</i>	
BACK-GUARD: WIRELESS BACKSCATTERING BASED USER ACTIVITY RECOGNITION AND IDENTIFICATION WITH PARALLEL ATTENTION MODEL .....	252
<i>Manjiang Yin, Xiang-Yang Li, Yanyong Zhang, Panlong Yang, Chengchen Wan</i>	
RLL: ACCURATE RELATIVE LOCALIZATION OF RFID TAGS WITH LOW LATENCY .....	262
<i>Xuan Liu, Quan Yang, Shigeng Zhang, Bin Xiao</i>	

ONLINE DISTRIBUTED EDGE CACHING FOR MOBILE DATA OFFLOADING IN 5G NETWORKS.....	272
<i>Yiming Zeng, Yaodong Huang, Zhenhua Liu, Yuanyuan Yang</i>	
ADDITIVE AND SUBTRACTIVE CUCKOO FILTERS.....	282
<i>Kun Huang, Tong Yang</i>	
DECODE-AND-COMPARE: AN EFFICIENT VERIFICATION SCHEME FOR CODED EDGE COMPUTING.....	292
<i>Mingjia Fu, Jin Wang, Jianping Wang, Kejie Lu, Admela Jukan, Fei Gu</i>	
GENERATIVE ADVERSARIAL NETWORKS-BASED PRIVACY-PRESERVING 3D RECONSTRUCTION.....	298
<i>Qinya Li, Zhenzhe Zheng, Fan Wu, Guihai Chen</i>	
GREENING RELIABILITY OF VIRTUAL NETWORK FUNCTIONS VIA ONLINE OPTIMIZATION.....	308
<i>Xiaojun Shang, Yu Liu, Yingling Mao, Zhenhua Liu, Yuanyuan Yang</i>	
REVISITING MULTIPATH CONGESTION CONTROL FOR VIRTUALIZED CLOUD ENVIRONMENTS.....	318
<i>Chi Xu, Jia Zhao, Jiangchuan Liu, Fei Chen</i>	
PRIVATE DEEP NEURAL NETWORK MODELS PUBLISHING FOR MACHINE LEARNING AS A SERVICE.....	328
<i>Yunlong Mao, Boyu Zhu, Wenbo Hong, Zhifei Zhu, Yuan Zhang, Sheng Zhong</i>	
SERPENS: A HIGH-PERFORMANCE SERVERLESS PLATFORM FOR NFV.....	338
<i>Junxian Shen, Heng Yu, Zhilong Zheng, Chen Sun, Mingwei Xu, Jilong Wang</i>	
NETWORK-BASED MALWARE DETECTION WITH A TWO-TIER ARCHITECTURE FOR ONLINE INCREMENTAL UPDATE.....	348
<i>Anli Yan, Zhenxiang Chen, Riccardo Spolaor, Shuaishuai Tan, Chuan Zhao, Lizhi Peng, Bo Yang</i>	
MULTI-LAYER COORDINATION FOR HIGH-PERFORMANCE ENERGY-EFFICIENT FEDERATED LEARNING.....	358
<i>Li Li, Jun Wang, Xu Chen, Cheng-Zhong Xu</i>	
TAG POLLUTION DETECTION IN WEB VIDEOS VIA CROSS-MODAL RELEVANCE ESTIMATION.....	368
<i>Yixin Chen, Xinye Lin, Keshi Ge, Wenbo He, Dongsheng Li</i>	
TOWARDS LIGHTWEIGHT SERVERLESS COMPUTING VIA UNIKERNEL AS A FUNCTION.....	378
<i>Bo Tan, Haikun Liu, Jia Rao, Xiaofei Liao, Hai Jin, Yu Zhang</i>	
GEOCLONE: ONLINE TASK REPLICATION AND SCHEDULING FOR GEO-DISTRIBUTED ANALYTICS UNDER UNCERTAINTIES.....	388
<i>Tiantian Wang, Zhuzhong Qian, Lei Jiao, Xin Li, Sanglu Lu</i>	
MPTCP+: ENHANCING ADAPTIVE HTTP VIDEO STREAMING OVER MULTIPATH.....	398
<i>Jia Zhao, Jiangchuan Liu, Cong Zhang, Yong Cui, Yong Jiang, Wei Gong</i>	
AGE-AWARE FAIRNESS IN BLOCKCHAIN TRANSACTION ORDERING.....	404
<i>Yaakov Sokolik, Ori Rottenstreich</i>	

TAMING THE WILDCARDS: TOWARDS DEPENDENCY-FREE RULE CACHING WITH FREECACHE.....	413
<i>Rui Li, Bohan Zhao, Ruixin Chen, Jin Zhao</i>	
ADAPTIVE AND ROBUST NETWORK ROUTING BASED ON DEEP REINFORCEMENT LEARNING WITH LYAPUNOV OPTIMIZATION .....	423
<i>Zirui Zhuang, Jingyu Wang, Qi Qi, Jianxin Liao, Zhu Han</i>	
I KNOW IF THE JOURNEY CHANGES: FLEXIBLE SOURCE AND PATH VALIDATION .....	433
<i>Fan Yang, Ke Xu, Qi Li, Rongxing Lu, Bo Wu, Tong Zhang, Yi Zhao, Meng Shen</i>	
APPLICATION-LAYER DDOS DEFENSE WITH REINFORCEMENT LEARNING .....	439
<i>Yebo Feng, Jun Li, Thanh Nguyen</i>	
LOCALIZING FAILURE ROOT CAUSES IN A MICROSERVICE THROUGH CAUSALITY INFERENCE.....	449
<i>Yuan Meng, Shenglin Zhang, Yongqian Sun, Ruru Zhang, Zhilong Hu, Yiyin Zhang, Chenyang Jia, Zhaogang Wang, Dan Pei</i>	
GUARDRIDER: RELIABLE WIFI BACKSCATTER USING REED-SOLOMON CODES WITH QOS GUARANTEE.....	459
<i>Xin He, Weiwei Jiang, Meng Cheng, Xiaobo Zhou, Panlong Yang, Brian Kurkoski</i>	

**Author Index**