

# IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY

A PUBLICATION OF THE IEEE VEHICULAR TECHNOLOGY SOCIETY

DECEMBER 2018

VOLUME 67

NUMBER 12

ITVTAB

(ISSN 0018-9545)

---

PAPERS

*Connected Vehicle Series*

Secure Resource Allocation for LTE-Based V2X Service ..... *K. J. Ahmed and M. J. Lee* 11324

An Adaptive Multipath Algorithm to Overcome the Unpredictability of Heterogeneous Wireless Networks for High-Speed Railway ..... *Y. Zhang, P. Dong, S. Yu, H. Luo, T. Zheng, and H. Zhang* 11332

*Channel Models*

Statistical Characterization of Second-Order Scattering Fading Channels ..... *J. Lopez-Fernandez and F. J. Lopez-Martinez* 11345

*Communication Circuits and Systems*

Joint Precoder and Equalizer Design for Multi-User Multi-Cell MIMO VLC Systems ..... *H. Yang, C. Chen, W.-D. Zhong, and A. Alphones* 11354

Modeling and Control Design for Quadrotors: A Controlled Hamiltonian Systems Approach ..... *Y. Wu, K. Hu, and X.-M. Sun* 11365

*Transportation Systems*

Predictive Cruise Control Using High-Definition Map and Real Vehicle Implementation ..... *H. Chu, L. Guo, B. Gao, H. Chen, N. Bian, and J. Zhou* 11377

Adaptive Tube-Based Nonlinear MPC for Economic Autonomous Cruise Control of Plug-In Hybrid Electric Vehicles ..... *B. Sakhdari and N. L. Azad* 11390

Gravitational Apparent Motion-Based SINS Self-Alignment Method for Underwater Vehicles ..... *J. Li, W. Gao, and Y. Zhang* 11402

Modeling of Ladder-Secondary-Linear Induction Machine Using Magnetic Equivalent Circuit ... *P. Naderi and A. Shiri* 11411

*Vehicular Electronics*

Design of Collision Detection System for Smart Car Using Li-Fi and Ultrasonic Sensor ..... *P. Krishnan* 11420

Tire Force Distribution Method With the Constraints of Executable Drive Space Consideration ..... *D. Wang, Z. Qu, and J. Ding* 11427

A Novel Regenerative Electrohydraulic Brake System: Development and Hardware-in-Loop Tests ..... *Y. Yuan, J. Zhang, Y. Li, and C. Li* 11440

---

(Contents Continued on Page 11321)



---

Coordination Control of Differential Drive Assist Steering and Vehicle Stability Control for Four-Wheel-Independent-Drive EV . . . . .	<i>J. Wang, Z. Luo, Y. Wang, B. Yang, and F. Assadian</i>	11453
Preliminary Thermal Evaluation of Actuator for Steer-by-Wire Vehicle . . . . .	<i>M. A. H. Rasid, N. F. Abdullah, M. I. M. Sairaji, A. R. Razali, H. Peeie, M. I. Ishak, A. Ospina, and V. Lanfranchi</i>	11468
Vehicle Sideslip Angle and Road Friction Estimation Using Online Gradient Descent Algorithm . . . . .	<i>W. Chen, D. Tan, and L. Zhao</i>	11475
Recent Developments in Thermal Management of Electrified Powertrains . . . . .	<i>A. Lajunen, Y. Yang, and A. Emadi</i>	11486
Development of a Hierarchical Observer for Burned Gas Fraction in Inlet Manifold of a Turbocharged Diesel Engine . . . . .	<i>K. Nikzadfar and A. H. Shamekhi</i>	11500
<i>Wireless Communications</i>		
Secrecy Performance of Untrusted Relay Systems With a Full-Duplex Jamming Destination . . . . .	<i>R. Zhao, X. Tan, D.-H. Chen, Y.-C. He, and Z. Ding</i>	11511
Block Pilot Based Channel Estimation and High-Accuracy Signal Detection for GSM-OFDM Systems on High-Speed Railways . . . . .	<i>B. Gong, L. Gui, S. Luo, Y. L. Guan, Z. Liu, and P. Fan</i>	11525
Joint Coverage Enhancement by Power Allocation in Poisson Clustered Out-of-Band D2D Networks . . . . .	<i>J. Tang, G. Chen, and J. P. Coon</i>	11537
Average Throughput Analysis and Optimization in Cooperative IoT Networks With Short Packet Communication . . . . .	<i>L. Zhang and Y.-C. Liang</i>	11549
Investigation of Vehicle Positioning by Infrared Signal-Direction Discrimination for Short-Range Vehicle-to-Vehicle Communications . . . . .	<i>W.-Y. Shieh, C.-C. J. Hsu, C.-H. Lin, and T.-H. Wang</i>	11563
Charging While Moving: Deploying Wireless Chargers for Powering Wearable Devices . . . . .	<i>Y. Li, Y. Chen, C. S. Chen, Z. Wang, and Y.-H. Zhu</i>	11575
PRIDE: Path Integration Based Delay Estimation in Multi-Device Multi-Path Environments . . . . .	<i>W. Peng, X. Zhao, T. Jiang, and F. Adachi</i>	11587
Multi-Operator Fairness in Transparent RAN Sharing by Soft-Partition With Blocking and Dropping Mechanism . . . . .	<i>H.-T. Chien, Y.-D. Lin, H.-W. Chang, and C.-L. Lai</i>	11597
Cooperative Relaying Based Non-Orthogonal Multiple Access (NOMA) With Relay Selection . . . . .	<i>Z. Yu, C. Zhai, J. Liu, and H. Xu</i>	11606
Spread OFDM-IM With Precoding Matrix and Low-Complexity Detection Designs . . . . .	<i>T. Van Luong and Y. Ko</i>	11619
Performance Analysis of Collaborative Beamforming With Outdated CSI for Multi-Relay Spectrum Sharing Networks . . . . .	<i>Z. Hu, J. Cheng, Z. Zhang, and Y.-C. Liang</i>	11627
User Selection and Multiuser Widely Linear Precoding for One-Dimensional Signalling . . . . .	<i>M. Bavand and S. D. Blostein</i>	11642
Secrecy Analysis of Random MIMO Wireless Networks Over $\alpha$ - $\mu$ Fading Channels . . . . .	<i>L. Kong, S. Vuppala, and G. Kaddoum</i>	11654
Optimum Co-Design of Spectrum Sharing Between MIMO Radar and MIMO Communication Systems: An Interference Alignment Approach . . . . .	<i>M. Rihan and L. Huang</i>	11667
Cache-Aware Multicast Beamforming Design for Multicell Multigroup Multicast . . . . .	<i>Y. Zhou, F. R. Yu, J. Chen, and Y. Kuo</i>	11681
Security-Aware Proportional Fairness Resource Allocation for Cognitive Heterogeneous Networks . . . . .	<i>L. Xu, L. Cai, Y. Gao, J. Xia, Y. Yang, and T. Chai</i>	11694
Connectivity Analysis of a Highway With One Entry/Exit and Multiple Roadside Units . . . . .	<i>Y. Wang and J. Zheng</i>	11705
Two-Tier Energy Compensation Framework Based on Mobile Vehicular Electric Storage . . . . .	<i>N. Chen, J. Ma, M. Wang, and X. Shen</i>	11719
Analog Precoding Designs for Millimeter Wave Communication Systems . . . . .	<i>Y. Wang, W. Zou, and Y. Tao</i>	11733
Minimization of PAPR for DFT-Spread OFDM With BPSK Symbols . . . . .	<i>J. Kim, Y. H. Yun, C. Kim, and J. H. Cho</i>	11746
Low Complexity Zero Forcing Detector Based on Newton-Schultz Iterative Algorithm for Massive MIMO Systems . . . . .	<i>J. Minango and C. de Almeida</i>	11759
Approximate Sum Rate for Integer-Forcing Receiver With Imperfect Channel Estimation . . . . .	<i>A. S. Guerreiro, G. Fraidenraich, and L. L. Mendes</i>	11767
Efficient Beamspace-Based Algorithm for Two-Dimensional DOA Estimation of Incoherently Distributed Sources in Massive MIMO Systems . . . . .	<i>Z. Zheng, W.-Q. Wang, H. Meng, H. C. So, and H. Zhang</i>	11776

---

---

Simultaneous Positioning and Orientating for Visible Light Communications: Algorithm Design and Performance Analysis .....	<i>B. Zhou, V. Lau, Q. Chen, and Y. Cao</i>	11790
Waveform Design for Kalman Filter-Based Target Scattering Coefficient Estimation in Adaptive Radar System .....	<i>P. Chen, C. Qi, L. Wu, and X. Wang</i>	11805
Superimposed Pilot Optimization Design and Channel Estimation for Multiuser Massive MIMO Systems .....	<i>X. Jing, M. Li, H. Liu, S. Li, and G. Pan</i>	11818
Subcarrier and Power Allocation for the Downlink of Multicarrier NOMA Systems .....	<i>Y. Fu, L. Salaiin, C. W. Sung, and C. S. Chen</i>	11833
Systems Analysis of a Pattern Reconfigurable Antenna for Capacity Improvement of Cell Edge Users in Cellular Networks .....	<i>Y. You, K. L. Ford, J. M. Rigelsford, and T. O'Farrell</i>	11848
Secrecy Energy Efficiency Optimization for Artificial Noise Aided Physical-Layer Security in OFDM-Based Cognitive Radio Networks .....	<i>Y. Jiang, Y. Zou, J. Ouyang, and J. Zhu</i>	11858
Power Minimization in Distributed Antenna Systems Using Non-Orthogonal Multiple Access and Mutual Successive Interference Cancellation .....	<i>J. Farah, A. Kilzi, C. A. Nour, and C. Douillard</i>	11873
Secure Transmission in Cellular Multiuser Two-Way Amplify-and-Forward Relay Networks .....	<i>M. K. Shukla, S. Yadav, and N. Purohit</i>	11886
Density Evolution Based on Two-Type Degree Distribution Framework of Raptor-Like LDPC .....	<i>G. Zhang, Y. Xu, D. He, J. Sun, and W. Zhang</i>	11900
Persymmetric GLRT Detection in MIMO Radar .....	<i>J. Liu, W. Liu, J. Han, B. Tang, Y. Zhao, and H. Yang</i>	11913
Affine Projection Versoria Algorithm for Robust Adaptive Echo Cancellation in Hands-Free Voice Communications .....	<i>F. Huang, J. Zhang, and S. Zhang</i>	11924
Energy-Efficient Resource Allocation for HARQ With Statistical CSI .....	<i>X. Leturc, P. Ciblat, and C. J. L. Martret</i>	11936
Adaptive Retransmission Layer for Duty Cycle Wireless Networks .....	<i>D. Liu, M. Hou, Z. Cao, and J. Wang</i>	11950
A Cooperation Scheme for User Fairness and Performance Enhancement in NOMA-HCN .....	<i>P. Swami, V. Bhatia, S. Vuppala, and T. Ratnarajah</i>	11965
Secure Relay Selection for Two Way Amplify-and-Forward Untrusted Relaying Networks .....	<i>T. Mekkawy, R. Yao, N. Qi, and Y. Lu</i>	11979
Enhanced Adaptive Network Coded Cooperation for Wireless Networks .....	<i>H. Wang, M. Cheng, Q. Chen, X. Tang, and Q. Huang</i>	11988
<i>Wireless Networks</i>		
Analysis and Enhancement of Joint Security and Reliability in Cooperative Networks .....	<i>S. Poursajadi and M. H. Madani</i>	12003
On Optimality of Second-Highest Policy for Opportunistic Multichannel Access .....	<i>K. Wang, L. Chen, J. Yu, Q. Fan, Y. Zhang, W. Chen, P. Zhou, and Y. Zhong</i>	12013
A Markov Model for Batch-Based Opportunistic Routing in Multi-Hop Wireless Mesh Networks .....	<i>C. Zhang, C. Li, and Y. Chen</i>	12025
Computational Intelligence Inspired Data Delivery for Vehicle-to-Roadside Communications .....	<i>C. Wu, T. Yoshinaga, Y. Ji, and Y. Zhang</i>	12038
Analysis and Optimization of Multiple Unmanned Aerial Vehicle-Assisted Communications in Post-Disaster Areas .....	<i>S. Zhang and J. Liu</i>	12049
Revealing Privacy Vulnerabilities of Anonymous Trajectories .....	<i>S. Chang, C. Li, H. Zhu, T. Lu, and Q. Li</i>	12061
High-Efficient Resource Allocation in Data Relay Satellite Systems With Users Behavior Coordination .....	<i>L. Wang, C. Jiang, L. Kuang, S. Wu, H. Huang, and Y. Qian</i>	12072
A Probabilistic Approach to Deploying Disaster Response Network .....	<i>H. Nishiyama, T. G. Rodrigues, and J. Liu</i>	12086
Proportional and Preemption-Enabled Traffic Offloading for IP Flow Mobility: Algorithms and Performance Evaluation .....	<i>Y. Ren, C.-W. Tung, J.-C. Chen, and F. Y. Li</i>	12095
Intrusion Detection Based on $k$ -Coverage in Mobile Sensor Networks With Empowered Intruders .....	<i>H. Huang, T. Gong, R. Zhang, L.-L. Yang, J. Zhang, and F. Xiao</i>	12109
GTCCS: A Game Theoretical Collaborative Charging Scheduling for On-Demand Charging Architecture .....	<i>C. Lin, S. Wei, J. Deng, M. S. Obaidat, H. Song, L. Wang, and G. Wu</i>	12124
Distributed Resource Allocation and Computation Offloading in Fog and Cloud Networks With Non-Orthogonal Multiple Access .....	<i>Y. Liu, F. R. Yu, X. Li, H. Ji, and V. C. M. Leung</i>	12137

---

---

Joint Power-Rate-Slot Resource Allocation in Energy Harvesting-Powered Wireless Body Area Networks . . . . .	Z. Liu, B. Liu, and C. W. Chen	12152
A New Probabilistic Multi-Hop Broadcast Protocol for Vehicular Networks . . . . .	X. Zeng, M. Yu, and D. Wang	12165
Decentralized Caching Schemes and Performance Limits in Two-Layer Networks . . . . .	L. Zhang, Z. Wang, M. Xiao, G. Wu, Y.-C. Liang, and S. Li	12177
PCF-Based LTE Wi-Fi Aggregation for Coordinating and Offloading the Cellular Traffic to D2D Network . . . . .	B. Ismaiel, M. Abolhasan, W. Ni, D. Smith, D. Franklin, E. Dutkiewicz, M. M. Krunz, and A. Jamalipour	12193
Cooperative Video Transmission Strategies via Caching in Small-Cell Networks . . . . .	X. Liu, N. Zhao, F. R. Yu, Y. Chen, J. Tang, and V. C. M. Leung	12204
Joint Radio Resource Allocation and Control for Vehicle Platooning in LTE-V2V Network . . . . .	J. Mei, K. Zheng, L. Zhao, L. Lei, and X. Wang	12218
Ultra-Dense 5G Small Cell Deployment for Fiber and Wireless Backhaul-Aware Infrastructures . . . . .	A. L. Rezaabad, H. Beyranvand, J. A. Salehi, and M. Maier	12231
NOMA-Assisted Multi-Access Mobile Edge Computing: A Joint Optimization of Computation Offloading and Time Allocation . . . . .	Y. Wu, K. Ni, C. Zhang, L. P. Qian, and D. H. K. Tsang	12244
Context Awareness Group Buying in D2D Networks: A Coalition Formation Game-Theoretic Approach . . . . .	Y. Zhang, Y. Xu, Q. Wu, Y. Luo, Y. Xu, X. Chen, A. Anpalagan, and D. Zhang	12259
Toward Traffic Patterns in High-Speed Railway Communication Systems: Power Allocation and Access Selection . . . . .	J. Lu, K. Xiong, X. Chen, and P. Fan	12273
Contention Intensity Based Distributed Coordination for V2V Safety Message Broadcast . . . . .	J. Gao, M. Li, L. Zhao, and X. Shen	12288
Secure and Private Information Retrieval (SAPIR) in Cloud Storage Systems . . . . .	M. K. Kiskani and H. R. Sadjadpour	12302
Joint Computation Offloading and User Association in Multi-Task Mobile Edge Computing . . . . .	Y. Dai, D. Xu, S. Maharjan, and Y. Zhang	12313
Caching D2D Connections in Small-Cell Networks . . . . .	N. Zhao, X. Liu, Y. Chen, S. Zhang, Z. Li, B. Chen, and M.-S. Alouini	12326
Machine Learning Aided Context-Aware Self-Healing Management for Ultra Dense Networks With QoS Provisions . . . . .	M. Qin, Q. Yang, N. Cheng, H. Zhou, R. R. Rao, and X. Shen	12339

---

CORRESPONDENCE

*Wireless Communications*

Adaptive Ambient Backscatter Communication Systems With MRC . . . . .	D. Li and Y.-C. Liang	12352
Low-Complexity Generalized Spatial Modulation Schemes Using Codebook-Assisted MIMO Detectors . . . . .	Y.-M. Chen, W.-C. Cheng, C.-P. Li, and Z. J. Haas	12358
Beamforming via Array Pattern Synthesis for Millimeter Wave NOMA Downlink Transmission . . . . .	J.-H. Lee and J. Song	12363
A High Spectral Efficiency Method Enabled by Opportunistic-Bit . . . . .	B. Jiao	12368
Outage Probability and Optimal Cache Placement for Multiple Amplify-and-Forward Relay Networks . . . . .	L. Fan, N. Zhao, X. Lei, Q. Chen, N. Yang, and G. K. Karagiannidis	12373
Analysis and Optimization for Weighted Sum Rate in Energy Harvesting Cooperative NOMA Systems . . . . .	B. Van Nguyen, Q.-D. Vu, and K. Kim	12379
Ergodic Capacity and SNR Analysis for Dual Hop Amplify and Forward Cooperative Communication Systems Over $\alpha - \eta - \mu$ Channels . . . . .	A. M. Magableh, T. Aldalgamouni, S. Mater, and O. S. Badarneh	12384
Maximum Likelihood and Soft Input Soft Output MIMO Detection at a Reduced Complexity . . . . .	K.-J. Yang and S.-H. Tsai	12389
Cooperative Multiuser Beamforming in mmWave Distributed Antenna Systems . . . . .	L. Bai, T. Li, Q. Yu, J. Choi, and W. Zhang	12394
A Low-Complexity Energy-Minimization-Based SCMA Detector and Its Convergence Analysis . . . . .	W. Yuan, N. Wu, C. Yan, Y. Li, X. Huang, and L. Hanzo	12398
Interference Analysis for Millimeter-Wave Networks With Geometry-Dependent First-Order Reflections . . . . .	M. Dong and T. Kim	12404

---

Convexity Properties of Detection Probability for Noncoherent Detection of a Modulated Sinusoidal Carrier . . . . .	12410
..... C. Ozturk, B. Dulek, and S. Gezici	
Sum Rate Maximization With Shortened Cyclic Prefix in a MIMO-OFDM System . . . N. Kim, O.-S. Shin, and K. B. Lee	12416
Physical Layer Security for TAS/MRC Systems With and Without Co-Channel Interference Over $\eta$ - $\mu$ Fading Channels ..... L. Yang, M. O. Hasna, and I. S. Ansari	12421
Physical-Layer Security for Mixed $\eta$ - $\mu$ and $\mathcal{M}$ -Distribution Dual-Hop RF/FSO Systems . . . . .	12427
..... L. Yang, T. Liu, J. Chen, and M.-S. Alouini	
Performance Analysis of Reactive Symbol-Level Jamming Techniques . . . . . H. S. Jang and B. C. Jung	12432
Computationally Efficient Constant-Envelope Precoding Algorithm for MISO Multicasting Using PSK Modulation . . . . .	12438
..... C.-E. Chen and Y.-F. Tsai	
On the Secrecy Performance of Generalized User Selection for Interference-Limited Multiuser Wireless Networks . . . . .	12442
..... Y. H. Al-Badarnah, C. N. Georgiades, R. M. Radaydeh, and M.-S. Alouini	
A New Cooperative Jamming Technique for a Two-Hop Amplify-and-Forward Relay Network With an Eavesdropper ..... Y. Choi and J. H. Lee	12447
<i>Wireless Networks</i>	
Virtual Infrastructure at Traffic Lights: Vehicular Temporary Storage Assisted Data Transportation at Signalized Intersections . . . . . H. Ding and Y. Fang	12452
Modularity-Based User-Centric Clustering and Resource Allocation for Ultra Dense Networks . . . . .	12457
..... Y. Lin, R. Zhang, L. Yang, and L. Hanzo	
Channel-Envelope Differencing Eliminates Secret Key Correlation: LoRa-Based Key Generation in Low Power Wide Area Networks . . . . . J. Zhang, A. Marshall, and L. Hanzo	12462