SPACE, AIR, GROUND INTEGRATED NETWORKING

FROM SINGLE- TO MULTI-COMPONENT PARETO OPTIMIZATION

ABSTRACT

Thanks to the spectacular advances in signal processing and nano-technology, five wireless generations have been conceived over tha past five decades. Indeed, near-capacity operation at an infinitesimally low error-rate has become feasible and flawless multimedia communications is supported in areas of high traffic-density, but how do we fill the huge coverage holes existing across the globe?

As a promising system-architecture, an integrated terrestrial, UAV-aided, airplane-assisted as well as satellite-based global coverage-solution will be highlighted to pave the way for seamless next-generation service provision. However, these links exhibit strongly heterogeneous properties, hence requiring different enabling techniques.

The joint optimization of the associated conflicting performance metrics of throughput, transmit power, latency, error probability, hand-over probability and link-lifetime poses an extremely challenging problem. Explicitly, sophisticated multi-component system optimization is required for finding the Pareto-front of all optimal solutions, where none of the above-mentioned metric can be improved without degrading at least one of the others...

- Aeronautical Ad Hoc Networking for the Internet-Above-the-Clouds, Zhang, Chen, Zhong, Wang, Zhang, Zuo, Maunder & Hanzo, Proc. of the IEEE'19

- Airplane-Aided Integrated Networking for 6G Wireless: Will It Work? Huang, Zhang, Liu, Guo & Hanzo IEEE Vehicular Technology Magazine, 2019, Vol. 14, Issue 3

- Enhancing the Resilience of Low Earth Orbit Remote Sensing Satellite Networks, by J. Yang, D. Li, S. Chen, and X. Jiang, IEEE Network

- Multicast Beamforming Optimization in Cloud-Based Heterogeneous Terrestrial and Satellite Networks, Hongming Zhang, Chunxiao Jiang, Jingjing Wang, Li Wang, Yong Ren and Lajos Hanzo IEEE TVT, 2020, Volume: 69, Issue: 2

- Robust Beamforming for Multibeam Satellite Communication in the Face of Phase Perturbations, Xin Zhang, Jingjing Wang, Chunxiao Jiang, Chaoxing Yan, Yong Ren and Lajos Hanzo IEEE TVT, 2019, Volume 68

- Twin-Component Near-Pareto Routing Optimization for AANETs in the North-Atlantic Region Relying on Real Flight Statistics, by Cui, Yetgin, Liu, Zhang, Ng & Hanzo, IEEE Open Journal of Vehicular Technology, 2021

- Multiobjective Optimization for Integrated Ground-Air-Space Networks: Current Research and Future Challenges, by Cui, Ng, Liu, Zhang, Nallanathan, Hanzo IEEE VTM, 2021

- Deep Reinforcement Learning Aided Packet-Routing for Aeronautical Ad-Hoc Networks Formed by Passenger Planes, by Liu, Cui, Zhang, Yang & Hanzo IEEE TVT, 2021

- Minimum-Delay Routing for Integrated Aeronautical Ad Hoc Networks Relying on Real Flight Data in the North-Atlantic Region, by Cui, Liu, Zhang, Yetgin, Ng, Maunder & Hanzo IEEE Open Journal of Vehicular Technology, 2021

- Deep Learning Aided Packet Routing in Aeronautical Ad-Hoc Networks Relying on Real Flight Data: From Single-Objective to Near-Pareto Multi-Objective Optimization by Liu, Zhang, Cui, Ng, Maunder & Hanzo IEEE Internet of Things Journal, 2021

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