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Editorial

Advanced Self-Organizing Technologies over Distributed Wireless Networks

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Self-organizing Networks (SON) have experienced an explosive growth during the last few years. The principal objectives of introducing self-organizing network are to effectuate substantial operational and capital expenditure (O/CAPEX) reductions by diminishing human involvement in network operational tasks, and to optimize network capacity, coverage, and service quality. The general idea of SON is to integrate network planning, configuration, and optimization into a single, mostly automated process requiring minimal manual intervention. Most research work focused on the mobile cellular network. However, the SON over the distributed sensor network can enhance the network robustness, improve the energy efficiency, and improve the transmission performances. Main features in distributed sensor networks include scalability with respect to the number of sensor nodes, self-configuration, self-optimization, self-healing, energy saving, and a sufficient degree of connectivity among nodes.

In this special issue, the SON protocols and technical solutions over both the distributed and centralized wireless networks are focused on. We have received a total of 21 original submissions, out of which ten papers were accepted for publication after peer reviewing. We regret that we had to reject many good papers due to the limited number of papers that can be published with in this special issue. The accepted papers cover a broad area of SON-related topics, including the self-configuration, self-optimization, self-healing, self-routing and self-clustering.

The physical cell identity (PCI) self-configuration is a main feature for the advanced wireless network; a paper entitled "*Automatic distributing schemes of physical cell identity for self-organizing networks*" by Y. Wei et al., proposes an automatic distributing PCI scheme to optimize the PCI reuse distance and decrease the multiplexing interference. Simulation results illustrate that the proposal can achieve a significant performance gain even under the condition of severe PCI deficiency.

For the self-optimization related aspect, there are 4 accepted papers. In a paper entitled "*Self-organizing energy-saving management mechanism based on pilot power adjustment in cellular networks*" by Y. Peng et al., the authors present a regional self-organizing energy-saving management mechanism through pilot power adjustment in cellular network. Another paper entitled "*Self-optimization of coverage and capacity in LTE networks based on central control and decentralized fuzzy Q-learning*" by J. Li et al. proposes a central control mechanism that utilizes the fuzzy Q-learning algorithm, where each eNB is a learning agent that tries to optimize its antenna downtilt automatically using information from its own and its neighboring cells, and the initialization and the termination of the optimization processes of all agents are in the control of the central entity. A paper entitled "*Hybrid BS-cooperative power management scheme for self-organized sleep mode in virtual cell-based femto networks*" by W. Zheng et al. discusses a hybrid BS-cooperative power management scheme for self-organized sleep mode in virtual cell-based femto networks. In the fifth paper entitled "*Self-organized connectivity control and optimization subjected to dispersion of mobile ad hoc sensor networks*" by Z. Mi et al., a distributed link removal algorithm

to reduce redundant communication links while preserving global connectivity and a distributed connectivity control system to disperse a team of mobile sensors with guaranteed connectivity and collisions avoidance are presented.

For the self-healing related aspect, a paper entitled "*Centralized management mechanism for cell outage compensation in LTE networks*" by L. Wenjing et al. presents a centralized cell outage compensation management mechanism and a concrete autonomic particle swarm compensation algorithm.

A paper entitled "*A novel hybrid self-organizing clustering routing algorithm*" and another paper entitled "*Vascular network-based nonuniform hierarchical fault-tolerant routing algorithm for wireless sensor networks*" researched the self-routing related techniques. A hybrid self-organizing clustering routing protocol by combining energy sense and maximum connectedness is introduced. A vascular network based fault tolerant routing algorithm is presented by nonuniform hierarchical clustering.

To support the SON functionalities, the location technique is very urgent. In another paper entitled "*Cooperative group localization based on factor graph for next-generation networks*" the weighted factor graph-based cooperative group localization algorithm which incorporates the optimal weights based on the information reliability is presented. Meanwhile, to improve the energy efficiency by the modification of choosing cluster-heads formula and the steady-state phase in the distributed sensor network, a vice cluster head for each cluster during the communication process is formulated, which aims to diminish the energy consumption spent on the reclustering and prolong the time of being steady-state phase.

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