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Selected Papers from the 1st ACIS International Workshop on Self-Assembling Wireless Networks

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The 1st ACIS International Workshop on Self-Assembling Wireless Networks (SAWN 2005) was held on May 24, 2005 at Towson University in Towson, Maryland, USA. The workshop provides a forum for the exchange of ideas and results among industry practitioners and researchers working on all aspects of self-assembling wireless networks, including, but not limited to: modeling and optimization of heterogeneous self-assembling wireless networks, authentication, privacy, and security, dynamic networks and dynamic graph algorithms, dynamic frequency and channel assignment, multi-hop routing in heterogeneous ad hoc and sensor networks, multi-path forwarding for fault tolerance, wireless multicasting, performance of end-to-end protocols over wireless networks, data aggregation and management, caching and prefetching for information access in wireless networks, mechanisms design and cooperation enforcement, synchronization and scheduling issues in ad hoc wireless networks, resource management in mobile, wireless and ad hoc networks, energy saving protocols for ad hoc and sensor wireless networks, monitoring management in sensor networks, mobility and location management, and algorithms for multimedia QoS and traffic management.

This special issue of J.UCS includes extended versions of 5 papers selected from the 14 papers presented at the workshop. These papers have passed an

additional rigorous refereeing process. The selected papers cover topics ranging from mobile ad hoc network (MANET) autoconfiguration to routing and Quality of service (QoS) support. We next give a brief overview of these papers.

Unlike wired networks, MANETs lack central administration, making dynamic configuration difficult. Most existing autoconfiguration protocols are independent of the underlying routing protocol, and thus result in high overheads. The paper by Boudjit *et al.* proposes novel duplicate address detection and autoconfiguration mechanisms complementing the Optimized Link State Routing Protocol (OLSR). The authors give a formal proof of correctness for their duplicate address detection protocol, and present a detailed simulation analysis of the overheads incurred by the autoconfiguration algorithm.

The paper by Jaddi and Paillassa introduces a cluster-based extension of the Dynamic Source Routing (DSR) protocol for MANETs, called Cluster Source Routing (CSR). CSR uses a 2-level hierarchical clustering of the network, with the upper level cluster head acting as a central route cache, and route discovery being performed through unicast communications between cluster heads. In the proposed protocol each node can autonomously move between DSR and CSR modes according to its node mobility and local network density. Simulation results show that this adaptability helps achieving enhanced performance over a broader range of network density and node mobility.

QoS techniques developed for wired networks do not extend gracefully to MANETs due to factors such as radio interference, limited availability of resources, and high mobility. The paper by Nguyen and Minet describes a modified version of OLSR providing interference-aware QoS support. Empirical experiments show that the overhead due to the QoS support is low, while the original efficiency of OLSR flooding is maintained.

In conjunction with data fusion, clustering is an important technique for reducing energy consumption in sensor networks. Data collected by the sensors is sent to cluster heads, which then forward the fused data to the sink. Due to their reliance on local sensor properties, existing clustering and head selection algorithms may result in load imbalance which in turns leads to reduced network lifetime. The paper by Qin and Zimmermann proposes a novel voting-based clustering algorithm (VCA) which integrates load balancing, energy, and topology information with a simple voting mechanism for cluster head selection. Simulation results show that VCA can extend network lifetime by 10-30% compared to existing clustering protocols.

A substantial part of MANET traffic is generated by route request broadcasting protocols. The paper by Hundewale *et al.* proposes a novel approach to route request broadcast based on node caching, which can be viewed as a dynamic implementation of a connected dominating set (CDS) protocol. The authors overcome the well-known overuse of dominating (cached) nodes by em-

ploying a new load-balancing scheme. The proposed approach is implemented as an extension of the Ad-hoc On-demand Distance Vector routing (AODV) protocol, and extensive simulation results show significant improvements in communication overhead, delay, and delivery ratio compared to the original AODV.

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