Theoretical and Practical Aspects of Large-scale Wireless Sensor Networks

Research in the field of Wireless Sensor Networks (WSNs) has come a long way since it began around a decade ago. While there have been numerous small-scale WSN test bed implementations by the research community, large-scale implementations, involving hundreds or even thousands of nodes which are static or mobile are still unheard of. This symposium focuses on the theoretical and practical challenges faced when dealing with large-scale wireless sensor networks involving static and/or mobile nodes.

Networks which scale thousands of static and/or mobile nodes need to possess a number of inherent characteristics in order to function properly. For example, scalability and distributed operation are essential characteristics for any large scale deployment. WSNs will only be widely adopted, if end-users are given guarantees about the operation of the system. Thus providing QoS guarantees is very important. However, providing such guarantees can be very difficult especially when one considers the unreliability of wireless links in WSNs. As resources such as energy, bandwidth, memory and computational power are highly constrained, novel techniques are required to manage the resources by maximizing the usage of cross-layer information, in order to guarantee the operation of the network in accordance with the end-user's requirements. The fact that manually administering every node individually is impossible, makes it vital for the system to have self-organizing and self-learning capabilities in every section of the protocol stack. Heterogeneity is another characteristic that makes the overall network architecture more robust and efficient.

This symposium seeks papers that present novel solutions to the problems listed above. Topics of interest include, but are not limited to, the following:

- Networking protocols (MAC, Routing, Transport, Time synchronization, QoS, Mobility support)
- Sensor information processing (Calibration, Adaptive sampling, Signal processing)
- Distributed algorithms for data management (Querying, Data aggregation, Coding, Storage)
- Theoretical and simulation-based modelling (Mobility models, Fundamental bounds and formulations)
- In-network data interpretation (Event detection and classification, Context-awareness, Adaptive recognition algorithms, On-line training and learning)
- Sensor-actuator coordination (Heterogeneous architectures, Distributed control)
- System support (Operating systems, Network monitoring and management, Network reprogramming, Simulation and debugging tools)
- Services (Service-oriented architectures, Service discovery, Localization and tracking, Security)
- Real-world experiences (Novel applications, Deployments, Experimental testbeds, Measurements)

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