MoNet Special Issue Editorial

Novella Bartolini · Prasun Sinha

Published online: 30 June 2010
© Springer Science+Business Media, LLC 2010

This special issue is devoted to papers on *heterogeneous networks*, with a particular emphasis on the aspects related to the quality of service, robustness and reliability.

Recent technological developments in wireless communications and mobile networks, broadband networks, pervasive computing, and distributed computing have led to a wide variety of new challenging problems. Interoperability among several different technologies is a primary issue that motivates research on a wide range of hot topics which span through the aspects of performance, survivability, resilience and scalability, in applicative scenarios consisting of large-scale wired and wireless networks. This special issue is an attempt to address several of these challenges.

When preparing this issue we selected five among more than forty papers.

The first paper of the issue “*Handling Mobility Management and QoS Aspects in All-IP Networks*” by Esam Alnasouri, Andreas Mitschele-Thiel, and Ali Diab focuses on the challenge of providing quality of service guarantees in all-IP networks. The authors emphasize the importance of integrating mobility management with resource reservation to satisfy the requirements of all-IP mobile communication networks. To this purpose they evaluate the performance of the protocol QoMIFA (QoS-aware Mobile IP Fast Authentication)

and compare it with the well-known Simple QoS signaling protocol under varying network workload.

The second paper “*iDSRT: Integrated Dynamic Soft Real-time Architecture for Critical Infrastructure Data Delivery over WLAN*” by Hoang Nguyen, Raoul Rivas, and Klara Nahrstedt introduces the technical challenges posed by critical infrastructures. In particular, the paper addresses the problem of how to deliver real-time monitoring data from critical infrastructure management systems such as SCADA (Supervisory Control and Data Acquisition systems) over wireless LANs.

SCADA systems are one of the best examples of heterogeneous networks as they require the interoperability among large wired architectures made up of thousands of monitoring and data processing points and wireless data distribution networks. The authors propose iDSRT, and integrated dynamic soft real-time system for the delivery of critical data over WLAN with guaranteed end-to-end delay. The proposal is evaluated through simulations and prototype implementation with promising results.

Wireless mesh networks constitute the topic of the third paper of this special issue “*Throughput Gateways-congestion trade-off in Designing Multi-radio Wireless Networks*” by Djohara Benyamina, Abdelhakim Hafid, and Michel Gendreau. In mesh networks, traffic is mostly routed through mesh gateways which may become unexpectedly congested even if mesh routers have enough throughput capacity. The authors address this problem proposing algorithms based on the combined optimization of three competing objectives, namely network deployment cost, interference between network channels and congestion of gateways whilst guaranteeing continuous service to mesh clients.

N. Bartolini (✉)
Department of Computer Science,
“Sapienza” University of Rome, Rome, Italy
e-mail: bartolini@di.uniroma1.it

P. Sinha
Department of Computer Science and Engineering,
Ohio State University, Columbus, OH, USA
e-mail: prasun@cse.ohio-state.edu

Heuristic solutions are also proposed and studied by means of simulations.

Wireless mesh networks are also dealt with in the fourth paper “*On Delay performance and Burst Assembly for Wireless Mesh and Optical Burst Switching Converged Metro Area Network*” by Jihene Rezgui, Abdeltouab Belbekkouche, and Abdelhakim Hafid. The authors analyze the problem of realizing metropolitan area networks integrating the use of mesh networks with the technology of optical burst switching, thus realizing a novel architecture called Optical Burst Wireless Mesh Architecture (OBWMA). An analytical model is proposed to study the end-to-end delay in OBWMA. Techniques to improve the quality of service of the aforementioned architectures are also proposed and analyzed by means of simulations.

The last paper of the issue “*On adaptive density deployment to mitigate the sink-hole problem in mobile sensor networks*” by Novella Bartolini, Tiziana Calamoneri, Annalisa Massini, and Simone Silvestri presents a solution to the problem of sink-hole in

mobile wireless sensor networks with static sinks. The use of multi-hop communication schemes to move data towards a common sink may cause an excessive routing workload in the nodes that are located few hops from the sink. In order to overcome this problem, the authors propose to move the sensors devoted to data relay so as to gradually increase their density in the sink proximity. Through extensive simulations the authors compare the proposed algorithm to other known techniques for mobile sensor deployment.

As guest editors of this issue, we would like to thank all the authors for submitting their work and the external reviewers for their indispensable contribution in finalizing this issue. We also wish to thank the MoNet Editorial Staff for their continuous support and the Editor-in-Chief, Professor Imrich Chlamtac, for giving us the opportunity to organize this issue.

We are very happy to present this special issue on heterogeneous networks and we sincerely hope that the readers will find interesting ideas in it and enjoy reading these papers.