Editorial

Angela Sara Cacciapuoti and Marcello Caleffi*

Department of Biomedical, Electronic and
Telecommunications Engineering,
University of Naples Federico II,
via Claudio 21, 80125 Napoli, Italy
E-mail: angelasara.cacciapuoti@unina.it
E-mail: marcello.caleffi@unina.it
*Corresponding author

Luigi Paura

Department of Biomedical, Electronic and
Telecommunications Engineering,
University of Naples Federico II,
via Claudio 21, 80125 Napoli, Italy
and
Laboratorio Nazionale di Comunicazioni Multimediali,
Consorzio Nazionale Interuniversitario per le
Telecomunicazioni (CNIT),
via Cinthia 4, 80126 Napoli, Italy
E-mail: paura@unina.it

Biographical notes: Angela Sara Cacciapuoti received her DrEng (*Summa Cum Laude*) in Telecommunications Engineering in 2005 and her PhD in Electronic and Telecommunications Engineering in 2009, both from the University of Naples Federico II. Since 2008, she has been with the Department of Biomedical, Electronic and Telecommunications Engineering (DIBET) of the University of Naples Federico II as a Postdoctoral Research Fellow. Currently, she is a Visiting Researcher at the Broadband Wireless Networking Lab of the Georgia Institute of Technology. Her research activities lie in the area of statistical signal processing, digital communications, and communication systems.

Marcello Caleffi received his Dr.Eng. (*Summa Cum Laude*) in Computer Science Engineering in 2005 from the University of Lecce, Italy and his PhD in Electronic and Telecommunications Engineering in 2009 from the University of Naples Federico II, Italy. Since 2008, he has been a Postdoctoral Research Fellow at the Department of Biomedical, Electronic and Telecommunications Engineering, University of Naples Federico II, Italy. Currently, he is a Visiting Researcher at the Broadband and Wireless Networking Laboratory of the Georgia Institute of Technology. His research activities lie in the area of ad hoc networks protocol design.

Luigi Paura has been a Full Professor of Telecommunications since 1994. In 1998, he has been with the Department of Electronic and Telecommunications Engineering (DIBET) of the University of Naples Federico II, and presently he

serves as the Head of the Department. From 1985 to 1986 and in 1991 he was a Visiting Researcher at the Signal and Image Processing Lab., University of California, Davis. Currently, his research activities are mainly concerned with statistical signal processing, digital communication systems and wireless networks. He is the co-author of more than 100 technical papers in international journals and conference proceedings.

1   Introduction

With the explosive proliferation of mobile communications and wireless computing devices, the scalability property is becoming an increasingly popular and important issue in wireless communication research, as it has been recognised as one of the key features for supporting pervasive networking scenarios.

The scalability concept involves several dimensions, like the node number, the data load, the user/application number, etc., and it is the basis to break up the cellular concept enriching it by multi-hop communications. Nevertheless, many aspects of scalable wireless communications are still open problems and, furthermore, some of the scalable solutions for wireless networks proposed so far are based on ideal assumptions not always justified in the practical applications.

The aim of this special issue is to bring together the state-of-the-art research contributions that address the major opportunities and challenges of scalable wireless communication and networking, with emphasis on the design, the analysis and the evaluation of new techniques and novel application scenarios. For this very exciting and interdisciplinary topic, we have received 77 responses to our call-for-papers from more than 30 nations. As a result of a thorough review process by experts in the respective areas, this special issue consists of nine selected papers. Two of the selected papers, the one authored by C. Wu and others and the one authored by E. Baccarelli and others, present research that was originally reported at the IEEE SASN'09: The International Workshop on Scalable Ad Hoc and Sensor Networks. The two works were selected for their strong contribution to the area of scalable wireless networks, and their original research was expanded for this special issue.

The issue starts with two papers focusing on multi-hop routing in wireless networks. The first paper by C. Wu, K. Kumekawa and T. Kato proposes a routing protocol for mobile ad hoc networks based on a distributed Q-learning algorithm for inferring network status information. Such a strategy allows the protocol to switch to more stable and bandwidth efficient routes before link failures. The second paper by D. De Caneva and P.L. Montessoro presents a technique for geographic multi-path routing protocols in wireless sensor networks, defined to as false destination forwarding, able to reduce the overhead due to the maintenance of disjointed paths.

The next two papers consider the field of media content distribution over wireless channels. The first paper authored by E. Baccarelli, N. Cordeschi, T. Patriarca and V. Polli proposes a closed-form cross-layer control policy able to maximise the average throughput for variable bit rate encoded media content over wireless connections. The second one by C. Greco and M. Cagnazzo provides a content discovery and routing protocol for real-time video streaming over mobile ad-hoc networks based on multiple description coding.

Two more papers deal with wireless localisation. The first paper by Y. Ji considers the critical parameters for indoor localisation systems based on receiver signal strength, by comparing both distance-based and database-based techniques. The second one authored by B. Kelley introduces a cooperative time localisation technique for wireless networks based on multi-carrier modulations.

The next paper by K.C. Ting, H.C. Lee and F. Lai proposes a scalable distributed coordination function for IEEE 802.11n networks based on a time division multiple access mechanism which partitions the active stations in several groups to reduce the collision events. The paper authored by M.S. Hossain and M. Atiquzzaman presents an analytical model to describe the mobility signalling overhead of two IPv6 mobility protocols. Finally, the last paper by F.K. Shaikh, A. Khelil, A. Ali and N. Suri proposes a reliable information transport mechanism for wireless sensor networks to provide application-specific tuneable reliability by means of probabilistic adaptive retransmissions, hybrid acknowledgement and retransmission timer management.

Together, these nine papers provide a very good sample of scalable approaches to the design of wireless ad hoc and sensor networks, and demonstrate the wide scope and variety of research issues in this area. However, despite the progress made in recent years, significant research is still needed to enable scalable wireless networks, and scalable design keeps attracting the interest of many researchers.

We are very thankful to the Editor-in-Chief of Inderscience *International Journal of Communications Networks and Distributed Systems*, Dr. Sudip Misra, for initiating this special issue and for his support and encouragement. We thank all the reviewers for providing valuable and timely reviews of the papers. We thank all the authors for their contribution to this special issue toward making this issue possible. Finally, we also thank the many authors of papers that we could not include in this issue.