

## Green networks

Samee Ullah Khan · Sherali Zeadally ·  
Pascal Bouvry · Naveen Chilamkurti

Published online: 9 June 2011  
© Springer Science+Business Media, LLC 2011

### 1 Introduction

The past decade has witnessed tremendous growth in networking protocols, technologies, and provisioning. Networks now include media, such as wired, wireless, ad hoc, WiFi, WiMax, and satellite. In essence, the entire planet is engulfed in information overflow because of networked computing devices, such as supercomputer centers, data repositories, and data centers. The aforementioned advancements are plausible and must be appreciated. However, researchers have not actively explored novel computer network architectures and communication protocols that reduce carbon footprint. Techniques and methodologies, such as the coscheduling of computational, storage, and network resources, dynamic circuit management, virtualization, migration, remote I/O utilization, redundancy, and information mitigation promise interesting and viable solutions that can enable green networking.

---

S.U. Khan (✉)

Department of Electrical and Computer Engineering, North Dakota State University Fargo, ND, USA  
e-mail: [samee.khan@ndsu.edu](mailto:samee.khan@ndsu.edu)

S. Zeadally

University of the District of Columbia, Washington, DC, USA  
e-mail: [szeadally@udc.edu](mailto:szeadally@udc.edu)

P. Bouvry

University of Luxembourg Luxembourg, Luxembourg  
e-mail: [pascal.bouvry@uni.lu](mailto:pascal.bouvry@uni.lu)

N. Chilamkurti

La Trobe University, Melbourne, Australia  
e-mail: [n.chilamkurti@latrobe.edu.au](mailto:n.chilamkurti@latrobe.edu.au)

## 2 Selected papers for the special issue

This special issue of the *Journal of Supercomputing* is a collection of outstanding papers in the aforementioned domain and state of the art topics in green networks. We had numerous submissions; however, in the end, we could only include nine papers. The papers range from theoretical foundations to modeling and simulation and from academic problems to real-world infrastructures. The papers included in this special issue are as follows.

“Energy-Efficient Networking: Past, Present, and Future” is a thorough survey of energy efficient networks, networking protocols, and net-centric computing.

“A Novel Optimization-based Bandwidth-aware Minimum Power Multicast Routing Algorithm in Green Wireless Networks” proposes a new routing protocol that optimizes energy consumption and bandwidth.

“Energy-Efficient Bandwidth Reservation for Bulk Data Transfers in Dedicated Wired Networks” is an excellent work on dedicated networks that are known to be resource hungry infrastructures. The work promotes a new method for bandwidth reservation that is energy-efficient and depicts a superior performance.

“Energy Efficient Peer-to-Peer File Sharing” advocates a new sharing model for P2P systems that is energy-aware and guarantees a stable performance.

“Convert-and-Deliver: A Scalable Multicast Optical Cross-Connect with Reduced Power Splitting Fan-out” proposes a novel methodology to reduce energy consumption at the optical splitter that also is scalable with the growth of the optical networks.

“Optimization of the Enhanced Distance Based Broadcasting Protocol for MANETs” is a study of broadcasting protocols in mobile networks with frequent disconnections. The work provides an excellent solution to minimize energy consumption in such mediums with intelligent broadcast protocols.

“LACAV: An Energy Conserving Channel Assignment Mechanism for Vehicular Ad hoc Networks” is a work that takes into account the high degree of network node mobility for channel reservation in a vehicular ad hoc networking scenario.

“GreenCloud: A Packet-level Simulator of Energy-aware Cloud Computing Data Centers” reports the first of its kind cloud computing simulator that can accurately measure the energy consumption of the underlying infrastructure.

“Network Monitoring for Energy Efficiency in Large-Scale Networks: the case of the Spanish Academic Network” is a study of real-world networking infrastructure—a unique study of its kind.

**Acknowledgement** The guest editors are in debt to the knowledgeable reviewers that delivered timely assessments on the research articles submitted to this special issue—thank you. This work was performed under the Luxembourg FNR Green-IT project (C09/IS/05).