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Editorial

Enabling Wireless Technologies for Green Pervasive Computing

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Wireless pervasive computing is a rapidly growing area that has attracted significant attention in recent years because of its ubiquitous deployment throughout our society. It is widely accepted that pervasive computing is having a tremendous impact on the way we live our life, conduct businesses, communicate with each other, and many other areas of life. Most of the technology enablers that make wireless pervasive computing feasible have been deployed with little consideration to the energy they consume during their operations. A recent study [1] found that if the current cost of power consumption continues to increase it may reach to a point where it will cost more money to power than to purchase information technology equipment such as servers. It is therefore imperative that new standards, protocols, and approaches are explored to minimize power consumption of various components (such as network interface cards, switches, routers, wireless/mobile devices, laptops, and desktops) that constitute the IT infrastructure [2]. To address the challenges of efficient energy consumption for wireless pervasive computing, this special issue focuses not only on the area of green pervasive computing but also on emerging technologies that are used to support sustainability and minimize carbon emission. This issue highlights some of the latest recent research results achieved for the various technologies (such as wireless sensor networks, Smart Grid, wireless local area networks, etc) currently being deployed and used in wireless pervasive computing and presents innovative solutions that can lead to a more sustainable, greener computing environment.

In "A reputation system for traffic safety event on vehicular ad hoc networks", Lo and Tsai propose an event-based reputation system that avoids the dissemination of false traffic warning messages. The major benefits of such a system include improving traffic safety and reducing driving time because in the later case false warning messages lead to unnecessary driving and increases the amount of fuel consumed. In "A cross-layer routing design for multi-interface wireless mesh networks", Tsai and Tsai address the issue of transmission power control and routing path selection for wireless mesh networks. They propose a cross-layer routing protocol called M2iRi2 that takes into account both the transmission power and intra/interflow interference as routing metrics to improve network throughput and end-to-end delay.

There has been a growing interest in renewable energy sources recently. Various types of renewable energy generators are being designed and deployed to maximize the production of renewable energy from natural sources. In "Intelligent decision-making system for renewable energy business in e-commerce based electricity markets on smart-grid", Kang et al. propose an Intelligent Decision Making System (IDMS) that is designed to address a major deficiency of current renewable generators namely, their sporadic output which is often difficult to predict and control. IDMS can be deployed to improve operation of intelligent power systems such as Smart Grids.

In their paper, "GRAdient cost establishment (GRACE) for an energy-aware routing in wireless sensor networks",

Khan et al. investigate the design of a dynamic energy-aware routing protocol for wireless sensor networks. The proposed routing protocol requires low power and communication bandwidth under dynamic network conditions and prolongs the lifetime of the underlying network. Their simulation results demonstrate that the proposed routing protocol achieves the desired performance objectives.

In "Achievable throughput-based MAC layer handoff in IEEE 802.11 wireless local area networks", Seo et al. propose a Media Access Control (MAC) layer handoff mechanism for IEEE 802.11 wireless local area networks to improve the performance of bandwidth greedy applications. By exploiting the Transient Frame Capture technique as an "on-the-fly" approach, an optimal Access Point is selected using maximum achievable throughput as metric instead of the traditional signal strength approach. The major benefit of such an approach is that it can be deployed without requiring any changes to Access Points since only the client needs software modifications. The fairness of the proposed handoff scheme is also demonstrated and validated with extensive simulations.

Body Senor Networks (BSNs) are becoming increasingly important for sporting activities and other healthcare systems. In "on PHY and MAC performance in body sensor networks", Ullah et al. present an empirical investigation on the performance of body implant communication using Radio Frequency (RF) technology. They used a model mimicking electrical properties of the basic body tissue and observed best performance at 3cm depth inside the liquid model. They also studied performance of low-power MAC protocols for an on-body sensor network using simulations.

The mobile devices such as PDA devices and Smart Phones are commonly used with Internet connection. As these devices have low-performance components due to very limited space, this can cause limited connection problems when connected to an online system with large artefacts data files. Ondrej Krejcar in "Problem solving of low data throughput on mobile devices by artefacts prebuffering" uses a model of data Prebuffering to achieve high data throughput. Using a real-time setup built on purpose for this experiment, he proved that accessing prebuffered data on a mobile device can significantly improve response time needed to view large multimedia data.

Fourth generation wireless systems require higher transmission rates which in turn need more power. As the world is preparing to reduce power consumption, mobile operators are looking at ways to reduce their operating costs and carbon footprint. In "A potential transmitter architecture for future generation green wireless base station", Bassoo et al. propose a potential architecture design for future Green wireless base station. The all-digital transmitter architecture uses a combination of envelop elimination and restoration (EER) and pulse width modulation (PWM) modulation. The performance of this model shows that 57% efficiency can be obtained for an OFDM signal limited to 8-dB peak to average power ratio.

Next Generation Networks (NGN) are expected to provide high throughput, low latency, and better quality of service. These NGNs are also required to be backward compatible with existing networks. In "Modeling energy consumption of dual-hop relay based MAC protocol n ad hoc networks", Ahmad et al. present an analytical energy consumption model for dual-hop relay based MAC protocols. This model can predict energy consumption in ideal environment and with transmission errors. It is shown that using a relay dual-hop model, a better throughput and energy efficiency are achieved.

We would like to take this opportunity to thank the Editor-in-Chief of EURASIP Journal on Wireless Communications and Networking, Professor. Luc Vandendorpe and all staff at Hindawi Publishing Corporation for their support during the preparation of this Special issue. We express our gratitude to all the anonymous reviewers who devoted much of their precious time reviewing all the papers submitted to this special issue. Their timely reviews greatly helped us select the best papers included in this issue. We also thank all authors who contributed to this special issue.

Finally, we hope you will enjoy reading this selection of papers and you will find this issue informative and helpful in keeping yourselves up-to-date in the field of green pervasive computing.

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