Special Issue on Recent Advances in Computer and Communication Networks Technology

Dramatic improvements in networking technologies over the past couple of decades have yielded substantial increase in computer and communication capabilities. A number of new networking technologies such as middleware, wireless mesh networks an WiMAX, global IPv6, new generation multimedia, and modern network security started taking off. To date, some of these development efforts have mainly focused on protocol standardization, product development, and network operations besides being research targets. We believe that the accumulated experience in new networking practices now provide interesting research opportunities, not only for the broader network research community, but also for those who have been involved in these advancement developments.

Despite the networking advances, however, the cost of developing communication network applications and products still remains remarkably high. Some of the complexity and cost of developing these new generation networking products can be alleviated by the use of highly flexible and secure middleware. Middleware is a system's software residing between the applications and the underlying operating systems and networks, and providing reusable services that can be deployed to create networked applications rapidly and robustly. Middleware platforms have generally expected static connectivity, reliable communication channels, and relatively high bandwidth. In this area, network design and planning still remain significant challenges to researchers.

The articles in this Special Issue of the Journal of Computing and Information Technology (CIT) describe some latest results of efforts that focus on the next network generations and advances in networking and services. The journal has been interested in papers describing significant research contributions to recent advances in the field of computer and communication networks where the topics of interest include both wired and wireless-based networks.

Techniques for developing distributed systems in the future Internet services, performance issues, and protocols focus on integrating many computing devices to act as a coordinated computational resource. Network management and self-management, and new methods of communication routing protocols have been the targets of this Special Issue. In this area, we accepted "Pre-emptive Dynamic Source Routing: A Repaired Backup Approach and Stability Based DSR with Multiple Routes".

Likewise, as we are facing new network traffic challenges and engineering, techniques for traffic classification and characterization have been very desirable topics for this Special Issue. Especially, we were expecting to receive articles that address QoS in all-IP networks with new services and resource management and congestion control. In this area, we have one accepted article: "Internet

Deployment of DPM-based IP Traceback." This article presents the Internet deployment guidelines for Deterministic Packet Marking (DPM).

In the wireless area, next-generation mobile networks will evolve out of existing wired and wireless networks of different nature by means of convergence. In particular, 3G and beyond networks, wireless mesh and multi-hop networks, internetworking of cellular-based wireless mesh networks, and heterogeneous wireless access networks have been of special focus of researchers and, therefore, of this Special Issue. Wireless mesh network technologies have been actively researched as key solutions to improve the performance and services of wireless personal area networks, wireless local area networks, and wireless wide-area networks for a variety of applications, such as voice, data, and video. We selected two articles in this area: "A Niched Pareto GA Approach for Scheduling Scientific Workflows in Wireless Grids" and "Design of Sequencing Medium Access Control to Improve the Performance of Wireless Networks." The first article describes some fundamental issues in wireless systems and the second one presents some solutions to MAC layer in wireless networks.

From a different angle, recently mobile ad hoc networks, wireless sensor networks, and infrastructure-based mobile cellular networks have been substantially the focus of research in the wireless network area. Wireless sensor networks have presented a new class of applications especially in process control, environmental monitoring, and emergency management. Sensor network applications can be developed manually in an ad hoc network fashion, which is costly. While we did not receive any contribution in the sensor network area, the energy analysis aspects discussed in the accepted paper "Constant Time Queries for Energy Efficient Paths in Multi-hop Wireless Networks" are useful for both wireless and sensor network media.

During the past decade, IT developers and end users have benefited from the network modeling and simulation, performance analysis, optimization, network capacity, and fairness. Next generation of multimedia services, in turn, pose new requirements and challenges on the treatment of traffic within communication networks. Multimedia networks and applications and the concept of overlay networks have been great topics of research. Basing the ongoing advances in computer communications, contributions from academic researchers and industrial engineers have been welcome in this Special Issue of the journal. We selected "Modeling and Simulation of Quality of Service in VoIP Wireless LAN," that presents some research results in the area of voice over IP networks. This article describes a few applications for multimedia-enabled wireless IP networks.

In future issues of this journal, researchers are encouraged to submit articles mainly focused on the networking technology. The Journal is especially interested in articles that present emerging market requirements for future computer networks and services, such as flexible network architecture with easy deployment, self-configuration, low maintenance, and low cost. We are also interested in research results with interoperability and the existing support of multiple access methods, hierarchical mobility management, high system capacity, reliable multi-hop and multi-path communications. Recently, there has also been substantial growth in the development and use of peer-to-peer (P2P) systems. P2P computing offers advantages over earlier networked application architectures, including self-organization, automatic load balancing and scalability. The success of these systems is partially owed to their ability to harness idle storage and network resources, often offered by computers volunteered by their owners to participate in the system. In the security aspects of networking, we will still be glad to thrive again in later issues to identify quality papers. We hope you enjoy this Special Issue.

Nader F. Mir, CIT Guest Editor

Guest Editor

Nader F. Mir is currently a professor and the Department Associate Chairman of Electrical Engineering at San Jose State University, California. He is also the Director of MSE Program in optical sensor networks for Lockheed-Martin Space Systems Corporation, California. He is also an expert in intellectual property cases in telecommunications and computer networks. He received the B.Sc. degree (with honors) in electrical engineering in 1985, and the M.Sc. and Ph.D. degrees both in electrical engineering from Washington University in St. Louis, MO, in 1990 and 1995 respectively. Prior to this position, he was an associate professor at this school, and assistant professor at the University of Kentucky in Lexington. From 1994 to 1996, he was a research scientist at the Advanced Telecommunications Institute, Stevens Institute of Technology in New Jersey, working on the design of advanced telecommunication networks. From 1990 to 1994 he was with the Computer and Communications Research Center at Washington University in St. Louis and worked as a research assistant on design and analysis of high-speed switching systems project. From 1985 to 1988, he was with Telecommunication Research & Development Center (TRDC), Surrey, and as a telecommunications system research & development engineer he participated in the design of a high-speed digital telephone Private Branch Exchange, and received the best "design/idea" award. His research interests are: analysis of computer communication networks, design of networking devices and high-speed routers, wireless mobile ad-hoc and sensor networks, and applications of digital integrated circuits in computer communications. He is a senior member of the IEEE and has served as a member of technical program committee and steering committee of a number of major IEEE networking conferences such as WCNC, GLOBECOM, and ICC. Dr. Mir has published two books, one of which is a world-wide adopted text-book entitled "Computer & Communication Networks" published by Prentice Hall Publishing Co. He has also published numerous refereed technical journal and conference papers, all in the field of communications and networking. Currently, he has several journal editorial positions such as: the Editor of Journal of Computing and Information Technology, the Editorial Board Member of the International Journal of Internet Technology and Secured Transactions (in 2005), and the Associate Editor of IEEE Communication Magazine (2005-2008) and currently an Editor of the IEEE Communication Magazine. Dr. Mir has received a number of prestigious national and university awards including the university teaching recognition award and research excellence award. He is also the recipient of a number of outstanding presentation awards from leading international conferences. He was granted a successful U.S. Patent in 2006, claiming an invention related to hardware/protocol for use in high-speed computer communication networks.

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