Guest Editorial on Networking Technologies, Services and Protocols

Mobility and Quality of Services (QoS) are the major issues in today's computer networks research. Projections show that in the next few years we can expect the total number of mobile Internet users soon to exceed that of fixed-line Internet connections. The QoS perceived by the users is becoming a dominant factor in the success of Internet-based services. Furthermore, new Internet applications may require the delivery of multimedia data in real time (e.g., streaming stored video and audio), and the information transfer through the Internet is becoming one of the principal paradigms for business, e.g., electronic sales, banking, finance and collaborative work. The aim of this issue is to address the challenges in networking technologies, services and protocols to support mobility, multimedia and QoS.

The eight papers selected for publication came from different regions around the world, and address many different aspects of networking research from switching and multicasting to web services and video applications.

The first paper in the special issue is by Maurizio A. Bonuccelli and Alessandro Urpi. In "Mesh of Trees Topology for Output Queued Switches: Trading Speed-up with a Pipeline Technique" the authors present a new architecture for an output queued switch, which is based on a mesh of trees topology. The proposed solution is proved to mimic an FCFS output queued switch without suffering from speed-up problems.

Following this, the paper by Jun-Hong Cui, Jinkyu Kim, Dario Maggiorini, Khaled Boussetta, and Mario Gerla "Aggregated Multicast – A Comparative Study" focuses on multicast traffic and presents a scheme for routers state reduction. The basic idea is tree aggregation, which is based on forcing multicast groups to share a single delivery tree. Simulative results indicate that a significant state and tree management overhead reduction can be achieved paying a reasonable bandwidth and tunneling overhead.

Next, Hidetoshi Ueno, Norihiro Ishikawa, Hideharu Suzuki, Hiromitsu Sumino and Osamu Takahashi, in their paper "Performance Evaluation of WAP and Internet Protocols over W-CDMA Networks", present an interesting analysis aimed to evaluate the adequacy of the WAP protocol for the third generation mobile networks. The analysis highlights the problems of the WAP protocol and compares its performance with respect to the classical IP protocol stack (i.e. HTTP/TCP/IP). The comparison is performed by studying the response time of getting a page over a testbed that includes a real WAP gateway implementation and an emulated WAP client.

In the next paper on "Sender-Side TCP Modifications: An Analytical Study", Renato Lo Cigno, Gregorio Procissi and Mario Gerla apply the OMQN approach to evaluate sender-side modifications to the TCP protocol. Specifically, they analyze the transient behavior of TCP and show that, in presence of short lived connections, the impact of TCP transient behavior on the network performance is dominant.

The replication of Web services is the topic of "Content Delivery Policies in Replicated Web Services: Client-Side vs. Server-Side", by Marco Conti, Enrico Gregori, and Willy Lapenna. Replication techniques have an important role for providing web services with quality of service guarantees as requested by emerging multimedia applications (e.g., real time streaming of stock quotes). This paper compares and contrasts the two possible approaches for geographical replications: server-side and client-side. Pros and cons of these techniques are deeply investigated.

Multimedia services are also the topics of the next three papers focusing on managing video applications in packet switching networks. The paper by Adamantia Alexandraki and Michael Paterakis on "Performance Evaluation of the Deadline Credit Scheduling Algorithm for Soft-Real-Time Applications in Distributed Video-on-Demand Systems" focuses on video-on-demand systems. The authors investigate a promising scheduling algorithm, Deadline Credit algorithm, that exploits the available bandwidth and buffer space to serve a diverse class of pre-recorded video applications.

Multicast multi-layered video transmission is the topics of the paper "Improving Feedback Merging for Source-Adaptive Layered Multicast Schemes" by Paulo André da S. Gonçalves, José F. de Rezende, Otto Carlos M.B. Duarte, and Guy Pujolle. The paper focuses on source-adaptive layered multicast schemes. It investigates procedures for reducing the network load and avoiding feedback implosions at the source by merging the feedback signals in special nodes (merging nodes). The authors demonstrate how to increase the efficiency of the merging nodes tuning the feedback transmissions and the temporal merging mechanisms.

The final paper of the special issue by Elias Balafoutis, Antonis Panagakis, Nikolaos Laoutaris, and Ioannis Stavrakakis, "Study of the Impact of Replacement Granularity and Associated Strategies on Video Caching" presents a new caching scheme for video streaming applications. This scheme is based on partitioning large video files into small chunks. Because the popularity of the contents varies occasionally or frequently, the performance of the caching scheme is evaluated by byte

hit ratio and the responsiveness to changes in popularity. Authors examine the tradeoff between the byte hit ratio and the responsiveness and propose a mechanism that modifies on the fly the granularity of the replacement unit.

As guest editors it has been a great pleasure to put together this issue. We would like to thank the authors for their contributions and the reviewers for their time, energy, and comments that helped shape this special issue.

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Enrico Gregori received the Laurea in electronic engineering from the University of Pisa in 1980. He joined CNUCE, an institute of the Italian National Research Council (CNR) in 1981. He is currently a CNR Research Director. In 1986 he held a visiting position in the IBM research center in Zurich working on network software engineering and on heterogeneous networking. He has leaded several national and international projects on computer networking. He has authored more than 100 papers in the area of computer networks and has published in international journals and conference proceedings and is co-author of the book "Metropolitan Area Networks" (Springer, London, 1997). He was the General Chair of the second IFIP-TC6 Networking Conference Networking2002 and of the Eighth International Conference on Personal Wireless Communications (*PWC2003*). His current research interests include: Wireless access to Internet, wireless LANs, quality of service in packet-switching networks, energy saving protocols, evolution of TCP/IP protocols. He is on the Editorial Board of the *Cluster Computing* and *Computer Network* journals.