GUEST EDITORS' INTRODUCTION

The first four papers in this volume represent recent research in high speed networking in Europe. During the first years of this decade, a number of projects built high speed networks and testbeds in Europe: BERKOM in Germany, Cambridge University/Olivetti Research and Hewlett-Packard Labs in Britain, and the MultiG/Stockholm Gigabit Network program at SICS and the Royal Institute of Technology in Sweden, among some other ongoing projects. Some of this work was financed by the European Community's official research programs, and some was done commercially or in national research programs.

European high speed network research covers many important topics, some of which are addressed in the papers in this volume: medium-access protocols for optical networks, efficient computer/network interfaces, high speed cell relay networks, efficient ATM adaptation layer implementations, and parallel processing of protocols for high speed networks.

The first paper presents DTM, a network designed as part of the MultiG/Stockholm Gigabit Network program in Sweden. DTM is a fast circuit-switched network designed to provide real-time services for distributed multimedia applications. It uses a slotted access scheme that improves upon time division multiple access in its ability to reallocate unused slots among network nodes. This scheme gives high-capacity switching at low cost, which is claimed to be needed in a near future, when network capacity will grow faster than the processing speed of electronics.

The second paper is about the Jetstream network created at Hewlett-Packard's Bristol Laboratories. Jetstream is a local area network that provides ATM Adaptation Layer 5 service at almost a gigabit per second, at a very low cost. The network consists of switches where each switch port connects a ring of hosts. A user of an HP workstation on a Jetstream network can get very high performance using HP's single-copy TCP/IP implementation.

The third and fourth papers describe architectures and implementation techniques necessary to deliver high performance to users of gigabit networks. The MSNA architecture, described in the third paper, is used in the University of Cambridge/Olivetti Research Ltd. testbed. This testbed is probably the oldest gigabit testbed in Europe as it includes the Cambridge Fast Ring and Backbone Ring networks. As part of the MSNA architecture, the authors describe an efficient and simple ATM network interface to a workstation. One feature of this architecture is that it provides transport-like services at a lower layer, thereby eliminating multiplexing costs.

Parallel protocol processing is the subject of the last paper in this special issue. Research done at SICS and Uppsala University in Sweden, shows how the *processor-per-message* paradigm provides speed-ups for commonly used protocols such as UDP and TCP. This paper analyzes the effects of locking in parallel protocol implementations, describes the implementation of a multiprocessor version of the *x-kernel* and provides some encouraging performance results.

The fifth paper in this issue: "Hardware Measurement Techniques for High-Speed Networks," by A. Mink, Y. Fouquet and S. Wakid is a regularly accepted paper to this journal and not part of this special issue.

What then is the future of high-speed networking in Europe? The European Union is about to launch its fourth 5-year research program. High-speed networking will be part of the Advanced Communication Technologies and Services (ACTS) program. As part of this program, the European commission is discussing the possibility of supporting "national hosts" as experimental environments for field tests of new transmission and switching technologies, as well as for new services and applications. Research is proposed in the 10 to 40 Gbit/s range, and the applications include tele-teaching, tele-work, computer supported cooperative work, and road traffic informatics. So high-speed networking is coming up to speed in Europe.

Björn Pehrson
Royal Institute of Technology
KTH-Electrum/204
S-164 40 Kista, Sweden
bjorn@it.kth.se

Stephen Pink
Swedish Institute of Computer Science (SICS)
Box 1263
S-164 28 Kista, Sweden
steve@sics.se

Peter Sjödin
Swedish Institute of Computer Science (SICS)
Box 1263
S-164 28 Kista, Sweden
peter@sics.se