

GUEST EDITORIAL

The previous issue of the *Journal of High Speed Networks* formed Part 1 of a two-part special on lightwave networks employing wavelength division multiplexing (WDM). Six papers were published in that issue. In the current issue (Part 2), we publish six additional papers. All papers, either invited or submitted in response to our Call for Papers, are of high quality, and they were reviewed by at least two reviewers.

In the first paper of Part 2, "All-Optical Network Topologies Based on Expander Graphs", Pankaj considers an all-optical network employing wavelength-routing switches, to each of which is also attached an end-user. He then considers the "permutation routing problem", in which each and every user is the source as well as the sink of a connection, and investigates how many wavelengths are needed to support "permutation routing". He derives a simple lower bound as a function of the number and size of switches, and an upper bound based on the notion of expander graphs.

The paper "Routing of Multimedia Streams in Reconfigurable WDM Optical Networks" by Noronha and Tobagi considers the (multihop) logical topology design (and routing) problem in an all-optical network with a broadcast physical topology. In addition to the off-line design problem where all of the connection requests are assumed to be known in advance, it also considers the on-line problem. The authors present heuristic solutions to both design problems, and demonstrate that the performance of their heuristics is close to the best achievable performance by comparison with a bound (off-line case) and with an appropriate centralized switch (on-line case). An interesting feature of this paper is the modeling of the traffic scenarios in terms of streams and sessions.

The third paper, "Limits of Multicasting in a Packet-Switched WDM Single-Hop Local Lightwave Network" by Borella and Mukherjee, addresses a very relevant issue, viz. multicasting, for optical networks. This paper formulates a simple model and analyzes the limiting performance of WDM optical multicasting on a passive-star physical topology. The paper makes a good case for optical multicasting as a means for increasing the network's throughput.

In the next paper, entitled "Supporting Multipoint Connections in Multi-Hop WDM Networks", Tridandapani and Meditch consider how a multi-hop WDM network carrying multi-point (multicast) traffic can be configured so that a cost measure is minimized. Specifically, the paper considers algorithms for logical node placement in a multihop network so that the average hop distance for multi-point connections is minimized. This problem is of interest because multi-point traffic is likely to form a significant portion of traffic carried by future high speed networks.

In "Design Principles for Multi-Hop Wavelength and Time Division Multiplexed Optical Passive Star Networks", Tong *et al.* seek to establish a systematic way of designing multi-hop networks on stars using only one fixed-tuned transmitter and one fixed-tuned receiver per user. Specifically, they consider a combination of WDM and Time Division Multiplexing (TDM), and propose a Receiving Graph Model to represent these networks so that their inherent properties can be understood and alternative designs considered.

The final paper, "A Contention/Collision Free WDM Ring Network for Multi Gigabit Packet Switched Communication" by Chlamtac *et al.*, reports on some of the research work of an All-Optical Consortium being funded by the Advanced Research Projects Agency (ARPA). The authors consider a fiber-optic ring network in which nodes are connected via point-to-point fiber links and each link is operated over multiple wavelengths. The authors develop protocols which require either a tunable transmitter or a tunable receiver at each node. They evaluate the power budget to determine the number of nodes that can be supported.

This Special Issue was put together under very tight deadlines. This publication would not have been possible without the diligence of the authors (for submitting their work and quickly revising their papers in response to the reviews) and the reviewers (for their fast “turn-around” time); we sincerely appreciate their time and effort.

Finally, we thank Dr Deepinder Sidhu, Editor-in-Chief, for suggesting to us this topic, and for his encouragement throughout the preparation of the Special Issue.

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