

Guest-editorial

Survivable Optical Networks – Part I

Optical communication networks employing Wavelength Division Multiplexing (WDM) are poised to become the dominant networking infrastructure of the future. They enable efficient use of fiber capacity and spur the development of new high-bandwidth applications. While much research has been undertaken on various aspects of optical networks, the important issue of survivability in optical networks has not been addressed adequately. The aim of this Special Issue of the *Journal of High Speed Networks* is to consolidate new and original research work in this area.

Fundamental research papers and practical experience reports were solicited. Nine topical articles, two of which were invited, that present an insightful look at optical networks from the viewpoint of network survivability were selected. Four of them are published in the current issue, and the remaining five articles will be published in issue 10(4) of this journal.

The first article, by Kulathumani Vinodkrishnan, Nikhil Chandhok, Arjan Durresi, Raj Jain, Ramesh Jagannathan and Srinivasan Seetharaman presents a survey of the survivability techniques for IP over WDM networks. A number of optical layer protection techniques are discussed, and the recovery features of the multiple layers of the networks is studied under the premise that the optical layer can provide fast protection while the higher layers can provide intelligent restoration.

The second article, by Gökhan Şahin and Murat Azizoğlu, provides a framework for the joint assignment of routes and wavelengths to service and restoration paths in WDM networks with multiple service classes. The authors present quantified results of the capacity cost of protection as a function of the proportion of the protected traffic under mixed protected/unprotected and protected/low-priority traffic patterns.

The third article, by Murari Sridharan, Arun K. Somani and Murti V. Salapaka, focuses on two objectives of network operations, namely, capacity minimization and revenue maximization. A single integer linear programming is first provided as a common framework incorporating service disruptions, and a modified framework is then provided for revenue maximization under various service classes based on the required level of lightpath protection.

The final article, by Keping Long, Rod Tucker, Shiduan Cheng, Jian Ma and Runtong Zhang, presents two escalation strategies to achieve survivability in multiple layer networks such as WDM-based SDH networks or IP over WDM networks. The proposed scheme allows resources to be shared among adjacent layers preventing any redundant protection on lower layers. An optimization problem is formulated and simulation results are presented.

The five articles to be published in the sequel are: ‘Node wrappers for QoS monitoring in transparent optical nodes’ by Muriel Médard, Stephen R. Chinn and Poompat Saengudomlert (invited); ‘Fault diagnosis in optical networks’ by Irene Katzela, Georgios Ellinas, Won Sang Yoon and Thomas E. Stern; ‘Topology design and upgrade of an optical network by bottleneck-cut identification’ by Keyao Zhu, Laxman Sahasrabudde and Biswanath Mukherjee (invited); ‘Survivability of lightwave networks – path lengths in WDM protection scheme’ by Arunabha Sen, Bao Hong Shen and Subir Bandyopadhyay; and ‘Static versus dynamic establishment of protection paths in WDM networks’ by Vishal Anand and Chunming Qiao.

All articles went through the standard paper reviewing process of the *Journal of High Speed Networks*. We would like to thank the authors for sharing their invaluable ideas and experiences with the readers of this journal.

Hyeong-Ah Choi
Department of Computer Science
George Washington University
Washington, DC 20052
USA
E-mail: choi@seas.gwu.edu

Suresh Subramanian
Department of Electrical and Computer Engineering
George Washington University
Washington, DC 20052
USA
E-mail: suresh@seas.gwu.edu