

DIMACS

Series in Discrete Mathematics
and Theoretical Computer Science

Volume 46

Multichannel Optical Networks: Theory and Practice

DIMACS Workshop
March 16–19, 1998

Peng-Jun Wan
Ding-Zhu Du
Panos M. Pardalos
Editors



American Mathematical Society

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Multichannel Optical
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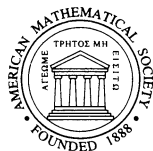
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NSF Science and Technology Center
in Discrete Mathematics and Theoretical Computer Science
A consortium of Rutgers University, Princeton University,
AT&T Labs, Bell Labs, and Bellcore



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This DIMACS volume contains papers from the DIMACS Workshop on Multichannel Optical Networks: Theory and Practice, which was part of the DIMACS Special Year on Networks. The Workshop was held on March 16–19, 1998, at Rutgers University.

1991 *Mathematics Subject Classification*. Primary 03B05, 90A05, 68T15, 68Q25, 68Q42, 68R10, 90C27, 90C30, 90B40, 68T01, 68Q15; Secondary 68Q22, 68Q25, 68P10.

Library of Congress Cataloging-in-Publication Data

Multichannel optical networks : theory and practice : DIMACS Workshop, March 16–19, 1998 / Peng-Jun Wan, Ding-Zhu Du, Panos M. Pardalos, editors.

p. cm. — (DIMACS series in discrete mathematics and theoretical computer science, ISSN 1052-1798 ; v. 46)

“NSF Science and Technology Center in Discrete Mathematics and Theoretical Computer Science, A consortium of Rutgers University, Princeton University, AT&T Bell Labs, Bellcore.”

Papers from the proceedings of the DIMACS Workshop on Multichannel Optical Networks : Theory and Practice held March 16–19, 1998 at Rutgers University.

Includes bibliographical references.

ISBN 0-8218-1004-9 (alk. paper)

1. Optical communications—Congresses. 2. Multichannel communication—Congresses. I. Wan, Peng-Jun, 1970– II. Du, Dingzhu. III. Pardalos, P. M. (Panos M.), 1954– . IV. Series. TK5103.59M845 1998

621.382'7—dc21

98-44528

CIP

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10 9 8 7 6 5 4 3 2 1 03 02 01 00 99 98

**“You must become an ignorant man again
And see the sun again with an ignorant eye
And see it clearly in the idea of it.”**

- Wallace Stevens (1942)

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Foreword

The DIMACS Workshop on Multichannel Optical Networks: Theory and Practice was held on March 16–19, 1998, at Rutgers University. We would like to express our appreciation to Ding-Zhu Du, Peng-Jun Wan and Panos Pardalos for their efforts to organize and plan this successful workshop.

The workshop was part of the broader Special Year on Networks. We extend our thanks to David Johnson, Stuart Haber and Mihalis Yannakakis for their work over many months as special year organizers.

The main focus of this workshop is on the theoretic and practical aspects of network design problems. Such problems include network architecture interconnection design, medium access control, channel assignment, wavelength routing, etc.

DIMACS gratefully acknowledges the generous support that makes these programs possible. The National Science Foundation, through its Science and Technology Center program, the National Security Agency, the New Jersey Commission on Science and Technology, DIMACS' partners at Rutgers, Princeton, AT&T Labs Research, Bell Labs and Bellcore generously supported the special year.

Fred S. Roberts
Director

Bernard Chazelle
Co-Director for Princeton

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Preface

For decades, time division multiplexing (TDM) has been the fundamental basis for adding capacity to digital telecommunications networks. In the past two years, wavelength division multiplexing (WDM) has emerged as an important and widely deployed complement to TDM. In fact, sales of systems based on the new technology have risen to over a billion dollars at breathtaking speed. The principle driver for this explosion was an unexpectedly rapid exhaustion of the capacity of long distance fiber networks. This fiber exhaust, combined with favorable economics for WDM, led to the use of the technology instead of other alternatives.

However, the WDM deployment raises a number of fundamental and challenging problems that require novel and innovative solutions. This volume presents papers addressing these problems from an interdisciplinary DIMACS workshop on multichannel optical networks held at DIMACS in March 1998. The workshop brought together leading computer scientists (theorists and practitioners) working in this area to discuss topics such as admission control, routing and channel assignment, multicasting and broadcasting, wavelength conversion, cost-effective network design, optical protection and fault-tolerance.

This book features application of theoretical/algorithmic results to practical problems as well as influence of practical problems to theoretical/algorithmic studies. The book would be suitable for a graduate seminar on optical networks.

We wish to thank the staff at DIMACS for helping to organize and host this event. We would also like to thank the participants of the conference, the authors, the anonymous referees, and Christine M. Thivierge and Gil Poulin of AMS for helping with this event and the preparation of this volume.

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ISBN 0-8218-1004-9



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