TABLE OF CONTENTS

CHAPTER 1: Defining All-Optical Networks 1

CHAPTER 2: The Importance of Optical Networks 3

CHAPTER 3: Relationship of an Enchanced Research Agenda in Optical Networking to Other Major Programs 6

CHAPTER 4: Research Focus and Research Modes 9

APPENDIX A: Device Issues 11

A.1 Devices for Wavelength Tuning 11
A.2 Star Couplers and Wavelength Changer 12
A.3 Optical Amplifiers 14
A.4 TDM Devices 17
A.5 Device Integration and Packaging 19
A.6 Limitations on WDM Systems Caused by Fiber Nonlinearities, Dispersion and Jitter 19

APPENDIX B: Networking Issues 22

B.1 Reconfigurability 22
B.2 Integrated Packet and Circuit Switched Networks 23
B.3 Scalability and Modularity 24
B.4 Local, Metropolitan and Wide Area Optical Communication Networks 25
B.5 Multiplexing for Optical Networks 26
B.6 Time-Division Channelization and Medium Access 31
B.7 Single-Hop vs. Multihop Systems 33
B.8 Evolution 33
B.9 WDM for Multiple Virtual Networks 35
B.10 Traffic Control and Performance Management 36
B.11 Fault Management 38
B.12 Optical Power Budget 40
B.13 Physical Topology Optimization 42

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INTRODUCTION

On January 11 and 12, 1993, a workshop sponsored by the National Science Foundation was held in Washington, D.C. and was attended by leading researchers in the field of all-optical networks. Backgrounds and skills of the workshop attendees included optical device technologies, telecommunication networks, and broadband applications. This report is the product of that workshop. Contained herein is a description of the many topics which were discussed and the major conclusions which were drawn.

Workshop attendees were unanimous in their opinion that the time is now at hand for a major new research thrust targeted specifically at all-optical networks. The early years of research in this field have begun to bear fruit and much fundamental knowledge and understanding has been generated. Also, a crisp vision has begun to emerge of the potential importance of an all-optical approach as the basis for (1) the nationwide telecommunication infrastructure of the 21st century, (2) Local and Metropolitan Area Networks, and (3) ultra high-speed computer interconnects for parallel processing. At the same time much additional work remains to be done in order that the potential of optical networks to enable multimedia communications, to provide immediate access to vast electronic information libraries, to improve economic competitiveness, and to enhance quality-of-life might be realized.

Chapter 1 of this report contains a working definition of all-optical networks. The importance of optical networks, along with the importance of a focused cross-disciplinary research program, is discussed in Chapter 2. The synergistic and complementary relationships between a new initiative in this field and (1) the High Performance Computing and Communications (HPCC) program and (2) the recently announced ARPA program in all-optical networks are described in Chapter 3. Finally, recommendations for the overall scope, size, and modes of a research agenda are presented in Chapter 4. Appendices A and B contain detailed descriptions of the device- and systems-level issues, respectively, which such a program should address.

REPORT ON

ALL-OPTICAL NETWORKS WORKSHOP

Held January 11 and 12, 1993