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Preface

As you will note, the 1999 Critical Review is an update of an earlier Review, SPIE Volume CR50, *Fiber Optics Reliability and Testing*, which was published in September 1993. CR50 included fiber optic components, subsystems, systems, and networks—the state-of-the-art technical performance and reliability at component and systems levels and its impact on systems/network performance, specifications, redundancy requirements, and size/weight/cost issues. All systems such as terrestrial, undersea, and space photonics were considered in 1993.

Since our last Critical Review in 1993, many new developments have been reported in optical transmission network architectures with applications to robust DWDM and extensive network of undersea cables. The late 90s' trend to include technologies such as optical amplifier, DWDM, and gratings combined with a variety of new services such as the Internet, broadband network, and multimedia, can only make this inroad much deeper in the millennium. An ultimate goal, beyond the point-to-point/multipoint transmission and distribution capability achieved thus far, is to provide a fault-tolerant reliable connectivity in multiuser networks where the electrical bottlenecks will be avoided altogether by performing all functions—e.g., switching, Mux/Demux—transparently in the optical domain. Technology for all-optical networking is still evolving with much development and engineering work remaining.

To assure low-maintenance long-lifetime systems, reliable fiber optics are being developed at a considerable effort. It is true that extensive use of fiber optics in both terrestrial and submarine communications has made even the skeptics believe in the reliability of lightwave systems. However, concern for reliability still remains in yet unexplored areas, such as space and other harsh environments, and for new products and applications such as DWDMs. Furthermore, developing high-reliability components and fail-safe systems at a competitive cost remains a daunting challenge.

This year we succeeded in lining up 16 invited speakers to address the topics of interest, which included 5 papers in fiber and fiber device, 6 on active devices (light sources, detectors, integrated optic modulators, MEMs, etc.), 3 on systems, and 2 on passive devices such as splitters and connectors. For the 1999 Critical Review, the focus has been on WDM/DWDM type of components and systems, and the invited speakers, each distinguished in his field of expertise, are drawn from around the world.

Another important distinction we have been able to achieve in 1999 is having this publication ready for distribution at the time of the SPIE Photonics East meeting in Boston. I would like to thank SPIE staff for all their assistance in

reminding/cajoling authors to submit their manuscripts and for their work in bringing this volume together.

I am confident that we shall have a wonderful day and a half of critical reviews of the fiber optic developments that have taken place since 1993.

Dilip K. Paul