Preface
Towards the Reality of Petabit Networks

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The telecommunications world is shifting drastically from voice oriented telephone networks to data oriented multimedia networks based on the Internet protocol (IP). Telecommunication carriers are positively extending their service attributes to new applications, and suppliers are changing their business areas and models, conforming to the radical market changes. The Internet, which was originally developed for correspondence among researchers, has evolved into a global communications platform. Improvements in security technology are encouraging businesses to integrate the Internet into their intranets, and the economic world and basic life styles are being changed by the many new Internet-based services, for example, electronic commerce (EC), that have become available.

This revolutionary change in telecommunications seems to come mainly from three motive forces. The first is the information society that has come into being with the wide and rapid deployment of personal computers and mobile communications. The second is the worldwide deregulation and the resulting competitive telecommunications environment, which facilitates active investment in the growing market to construct huge-capacity networks for exploding traffic. The third is photonic networks based on wavelength division multiplexing (WDM) technology, which can greatly increase the communication capacity and drastically decrease the transmission cost per channel. Photonic networks are attractive because they can also radically improve node throughput and offer transparency and flexibility while accommodating different signal formats and protocols, expandability for cost-effective gradual deployment, and high reliability, which is strongly required for a secure information society. The network management system (NMS) is inevitably becoming important in photonic networks to fully exploit

their capability.

In previous voice-oriented networks, conventional telecommunication systems supplied a gigabit capacity in a core backbone network, megabit capacities for enterprise and dedicated networks, and kilobit capacities for residential access. Today this is changing to terabit, gigabit, and megabit capacities, respectively. And in the future, we can even expect petabit, terabit, and gigabit ranges, respectively.

In Fujitsu, we have been striving to realize a photonic network, for example, we performed the world's first Tb/s transmission experiment in 1996, and developed the first practical 320 Gb/s system and demonstrated it at Supercomm'98 by combining optical add-drop multiplexer (OADM) and optical cross-connect (OXC) systems. We will continue to fully exploit the wide potentially usable low-loss region of fiber, aiming to utilize up to 1000 wavelengths. Our R&D activities are carried out not only in Japan but around the world with our customers and partners.

This special issue is devoted to photonic networks, beginning with their concept and forward view. It then continues with an outline of the products, including the terrestrial SONET/SDH optical transmission system (FLASH series), long-haul and metro WDM systems, and 10 Gb/s based WDM submarine systems; optical node technology such as OADM and OXC; a global access system based on ATM-PON; photonic network management; and new components/devices such as wideband amplifiers, high-speed devices, semiconductor optical devices, filters, and wavelength converters.

I am confident that the construction of the photonic network and the resultant increase in information quantity will bring changes in the quality of applications and services. I am also confident and optimistic that the photonic network will be a key element for constructing a rich information society in the 21st century.