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# 1 Researches on Photonic Networks in NICT

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This Special Issue on Photonic Networks provides a summary of the recent achievements of research conducted by the National Institute of Information and Communications Technology, or NICT, in relation to the fundamental technologies of optical communication. In terms of the overall organization of this issue, we are honored to begin with a review on international trends in research and development contributed by Dr. Kenichi Kitayama, Professor of the Graduate School of Osaka University. Starting from Chapter 3, research papers are divided into four sections by technical field and arranged under categories ranging, in order, from constituent technologies to subsystem technologies to network technologies. Specifically, Chapter 3 is entitled Physical Layer Implementation Technology/Optical Signal Processing, Chapter 4 presents Wavelength Routing/Optical Burst/Access Systems, Chapter 5 deals with Packet Switching, and Chapter 6 is entitled Interoperability. Although NICT is involved in two different types of research and development activities in the field of optical communication—*independent research and commissioned research*—in this special issue these papers are arranged by content, without distinguishing between the type of research and development involved. The aim of this structure is to allow for a technically comprehensible layout that will enable readers to easily review the entire journal.

The groundwork for NICT's research in optical communications was laid when the High-Speed Network Laboratory was founded in May 1995, during the period of the former

Communications Research Laboratory, to carry out the Research and Development Project for Basic and General-Purpose Technologies Related to Information Communication Infrastructure. We owe a great debt to the achievements of Dr. Kenichi Kitayama, the first Director of the Laboratory (who as mentioned above was generous enough to contribute the initial review for this issue). Dr. Kitayama nurtured the independent research group in the optical communication field to allow it to reach the potential we now see today, beginning at a time the Communications Research Laboratory lacked even a single optical communication researcher. The Research and Development Project for Basic and General-Purpose Technologies Related to Information Communication Infrastructure, initially a six-year program, was taken over one year ahead of schedule in fiscal 2000 by the Research and Development Project for Next-Generation Information Communication Infrastructure, a project aimed at research and development of fundamental petabit/s photonic network technologies. From fiscal 2001, when the Communications Research Laboratory was transformed into an independent administrative institution, independent research activities have been conducted in accordance with the stated mid-term objectives and plan. Last year, fiscal 2005, was the last year of the first mid-term plan as an independent administrative institution.

In terms of commissioned research, the Research and Development of Total Optical Communication Technology, an industry/academia project spanning 10 years, was initiated

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in 1996, in the course of which researchers tackled optical communication system technologies, consisting of high-speed technologies for transmission distances exceeding 10,000 km. The initiative entitled Research and Development of Optical Access Network High-Speed Wideband Communication Technology Related to Photonic Network was then launched in fiscal 2000, followed by Research and Development of Photonic Network Technologies Using Optical Burst Switching beginning in fiscal 2001, and by the Research and Development of Terabit Super Network from fiscal 2002, all commissioned by the Telecommunications Advancement Organization of

Japan. Each of these projects has played a role in the government's e-Japan Plan, pushing ahead with strategic research and development of 1,000-wavelength multiplexing, a 10 terabit/s optical router, and other technologies. As a result of the dissolution of the Telecommunications Advancement Organization of Japan and its integration with the Communications Research Laboratory in fiscal 2004, research from that point was taken over by NICT. As these four commissioned research projects all ended in fiscal 2005, this special issue is even more timely. Hopefully the above history will inform your review of the following papers.



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