

ITU-T Kaleidoscope Academic Conference 2010—Participation Report

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Abstract

Kaleidoscope 2010, the third academic conference hosted by ITU-T (International Telecommunication Union, Telecommunication Standardization Sector), took place in Pune, India, on December 13–15, 2010. Its theme was “Beyond the Internet?—Innovations for future networks and services”. Selected papers contributed from the world’s universities, industries, and academic institutions, including NTT, were presented and discussed.

1. Introduction

ITU-T (International Telecommunication Union, Telecommunication Standardization Sector) Kaleidoscopes are peer-reviewed academic conferences that highlight multidisciplinary aspects of future information and communications technologies (ICTs) through contributions from the world’s universities, industries, and academic institutions. Their aim is to increase the dialogue between experts working on ICT standardization and academia. ITU-T hopes that by viewing technologies through a *kaleidoscope*, the conferences will also seek to identify new topics for standardization. The first Kaleidoscope conference was held in Geneva, Switzerland, in 2008 focusing on “Innovation in NGN” (NGN: Next Generation Network) [1]. Following the second conference held in Mar del Plata, Argentina, on “Innovations for Digital Inclusion” [2], ITU-T Kaleidoscope 2010 (K-2010) took place in Pune, India, on December 13–15, 2010 [3]. It addressed the theme “Beyond the Internet?—Innovations for future networks and services” and focused on innovative technologies that could challenge the fundamental networking design principles of the Internet. NTT has contributed to the Kaleidoscopes from the beginning, and this time we gave a presentation on elastic and adaptive optical networks from the perspectives of possible adoption

scenarios and future standardization. In this article, I present a brief report of NTT’s participation in K-2010.

2. Conference overview

K-2010 was held at Sinhgad Technical Education Society (STES) in Pune, India, and had 329 registered participants from 24 countries. The conference program consisted of three keynote speeches, four invited talks, and 37 regular presentations that were carefully selected from 115 submitted papers.

The opening ceremony included the inaugural speech from the local authority, welcome speeches from the host and from K-2010 partners, and the opening address from the Director of ITU TSB (Telecommunication Standardization Bureau). The conference program followed the Indian protocol of presenting the keynote speakers and session chairs with flowers, coconuts, and Indian traditional scarves. Session 1, the keynote session, was presided over by Yoichi Maeda (TTC (Telecommunication Technology Committee), Japan), K-2010 General Chairman. This year’s keynote speeches were delivered by Uday B. Desai (Director, Indian Institute of Technology, Hyderabad, India, “Modern academia: teaching, research, development, patents and standards”), Tadao Saito (Professor Emeritus, University of Tokyo, Japan, “Vehicle communication: a future telecommunication market”), and Detlev Otto (CTO, Nokia Siemens Networks, Germany, “Future of

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communications? The individual user experience”). The following seven regular sessions dealt with “Rethinking the network”, “The future internet is for all”, “Protocol evolution and the future internet”, “Service innovations in the future internet”, “Regulation, standardization and stakeholder participation”, “Radio technologies and the future internet”, and “Future internet and the environment”.

K-2010 included two special sessions as new events: the “Standards corner” and “Jules Verne’s corner”. The Standards corner provided highlights on standardization activities in ITU-T relevant to the conference theme, including IPTV-GSI, FGFN, MyFIRE project, and Future Access Networks. It also introduced the participants to the ITU-T standardization activities and to a related industry perspective. The first Jules Verne’s corner (JVC) was intended to include in the Kaleidoscope program a session dedicated to the views of extremely advanced minds, able to think of 50 years and beyond as Jules Verne himself did in his literature. The objective was to share thoughts that might help develop communication concepts to generate the spark that could *make possible the impossible* during the second half of the 21st century.

Alongside K-2010, the following events took place at the same venue, from 13 to 17 December 2010: Standardization Tutorial, ITU IPTV-GSI event, ITU IPTV Interoperability event, IPTV Workshop, Global ICT Standardization Forum for India (GISFI) Standards meeting, and MyFIRE project event.

An official report on K-2010 is available on the ITU-T webpage [4].

3. NTT’s contributed paper

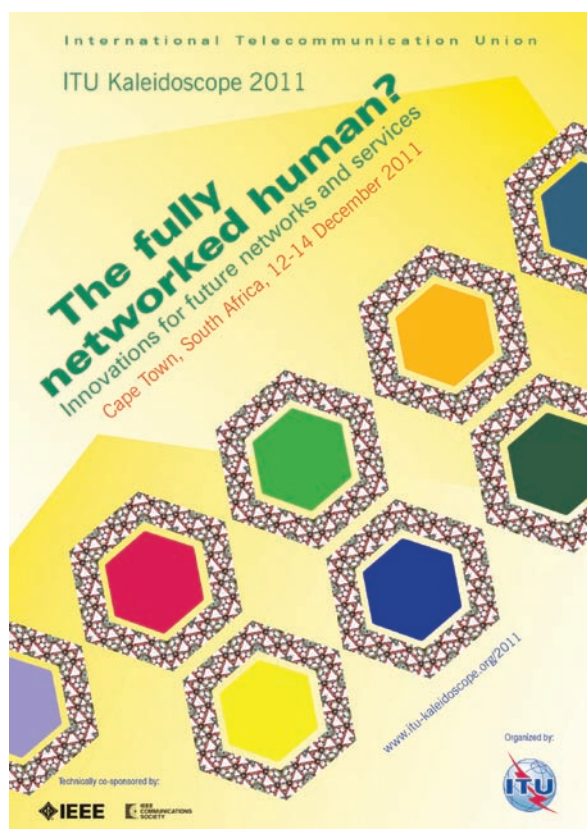
As a promising approach to cost-effectively accommodating the continuing growth in Internet protocol (IP) traffic, NTT recently proposed introducing elasticity and adaptation into optical transport networks through more flexible spectrum allocation, where the required minimum spectral resources are allocated adaptively according to traffic demand and network conditions [5], [6]. With future optical networks facing an impending capacity crunch, the spectral-efficiency-conscious networking approach has attracted growing interest and a number of bandwidth-variable optical network models have been investigated [7]–[10]. Since the introduction of elasticity and adaptation will be a big leap forward from conventional rigid and fixed optical networks, we believe that early initiatives by the standardization bodies to study pos-

sible extension of the standards for the Optical Transport Network (OTN), automatically switched optical network (ASON), and generalized multiprotocol label switching (GMPLS) in terms of optical network resource utilization efficiency will greatly support the rapid advance and adoption of more efficient and scalable optical networks.

The paper presented by NTT at the K-2010 was written by my colleagues and I from the perspective of future standardization to clarify what standards should be inherited, what standards should be extended, and what standards should be created as the starting point regarding study of the possible extension of OTN and ASON/GMPLS standards toward spectrally efficient elastic optical path networks [11]. In the presentation, I first overviewed the architecture, enabling technologies, and benefits of the elastic optical path network where the required minimum spectral resources are adaptively allocated to an optical path according to various network conditions including actual client traffic demand, physical network conditions, and the available bandwidth on the route. I then introduced a novel concept that network operators need to be aware of in order to allocate appropriate spectral resources to an end-to-end optical path. This concept is an optical corridor concept, which is an end-to-end spectrum window that is to be open at every wavelength cross-connect on the route. Possible adoption scenarios from current rigid optical networks to elastic optical path networks were also presented. One possible scenario is to introduce elasticity and adaptation on a step-by-step basis from the link level to the network level and from the static level to the dynamic level, probably led by the development of future higher-bitrate OTN interfaces. An earlier adoption possibility might be the introduction of distance-adaptive spectrum allocation to achieve cost-effective 100-Gbit/s-class reconfigurable optical add/drop multiplexer (ROADM) systems. As the starting point for studying the possible extension of OTN and ASON/GMPLS standards in terms of optical network efficiency, I clarified what should be inherited, what should be extended, and what should be created. Finally, I introduced some candidates for the structure and mapping of the OTN frame and some physical aspects with possible extension of the current frequency grid.

4. Concluding remarks

ITU-T Kaleidoscope 2010 focused on innovative technologies that could challenge the fundamental



networking design principles of the Internet. NTT presented a paper about possible adoption scenarios and potential standardization study items for elastic optical path networks to facilitate early initiatives for future standardization by the relevant standardization bodies. A detailed and updated version of our presentation will be published in the October Issue of the Standards Series of IEEE Communications Magazine.

The fourth ITU-T Kaleidoscope academic conference will take place in Cape Town, South Africa, on December 12–14, 2011 on the theme of “The fully networked human?—Innovations for future networks and services”. Additional information is available on the conference webpage [12].

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He received the M.E. degree in electronics engineering from Kanazawa University, Ishikawa, in 1986. He joined NTT to study ultrafast optical signal processing for high-capacity optical time division multiplexed transmission systems. From 1993 to 1994, he investigated optical sampling and optical time-domain reflectometry as a guest scientist at the National Institute of Standards and Technology (NIST), Boulder, Colorado, USA. He received the Ph.D. degree in engineering from Osaka University in 1995 for his work on ultrafast optical signal processing based on nonlinear effects in optical fibers. From 1996, he conducted pioneering research on ultra-wideband DWDM transmission systems in the L- and S-bands. In 2005, after two year's experience in developing wireless and wired access systems at NTT WEST, he started researching photonic networks with a focus on GMPLS and application-aware photonic networking in NTT Network Innovation Laboratories. His current interests include the architecture, design, management, and control of spectrally efficient elastic optical path networks, bandwidth-ROADMs/WXCs, and rate/format flexible optical transceivers. He has authored or co-authored over 150 peer-reviewed journal and conference papers during his 25-year career. He received the Young Engineer's Award in 1993 and the Best Tutorial Paper Award in 2011 from the Institute of Electronics, Information and Communication Engineers (IEICE), and Best Paper Awards from the 1997, 1998, and 2007 Optoelectronics and Communications Conferences (OECC) and the 2010 ITU-T Kaleidoscope Academic Conference.