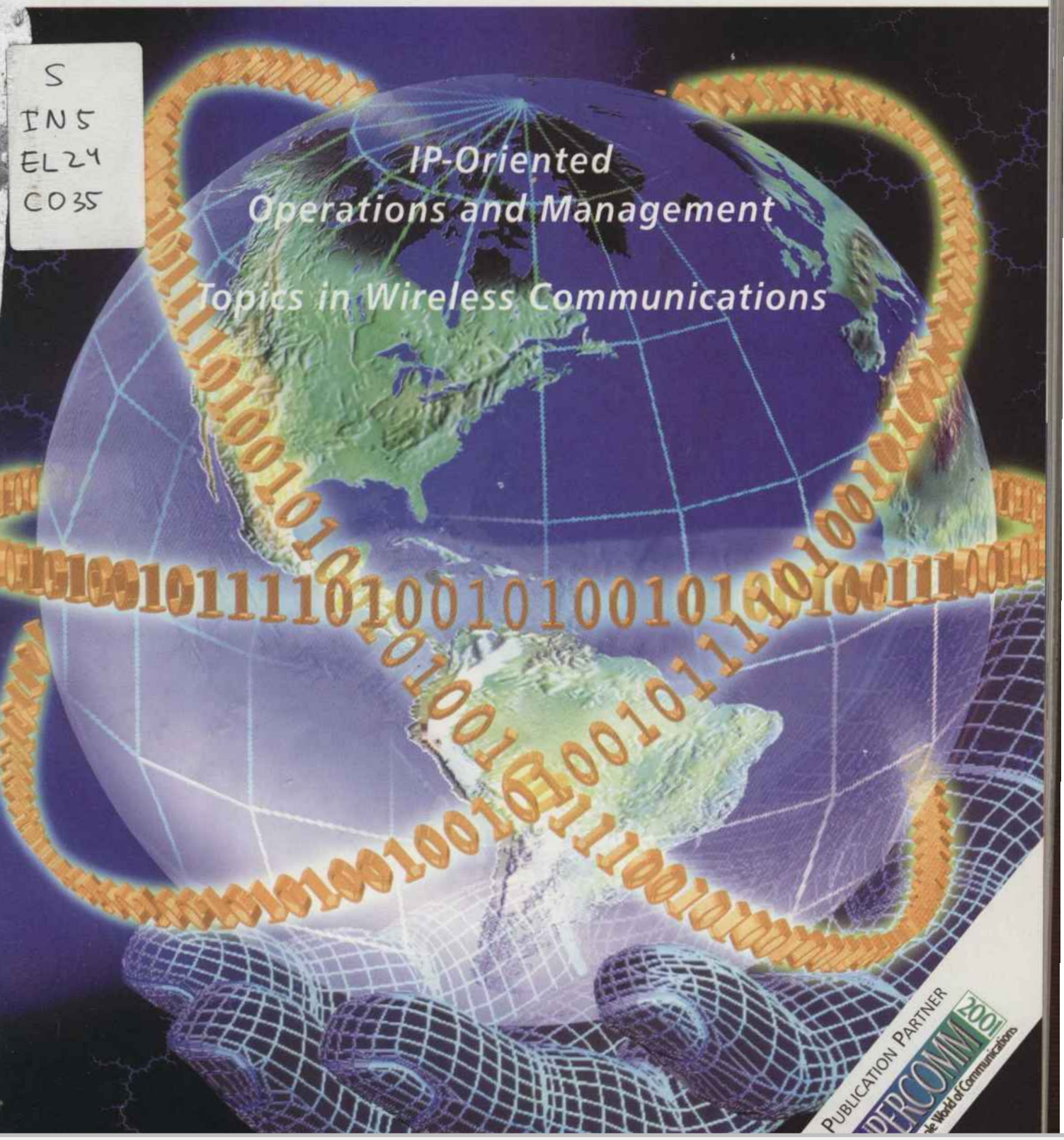
IEEE
Communications
MAGAZINE
www.comsoc.org
May 2001 Vol. 39 No. 5



IEEE Communications MAGAZINE

May 2001 Vol. 39 No. 5

www.comsoc.org/~ci

IP-Oriented Operations and Management

Guest Editors: Andrzej Jajszczyk and George Pavlou

Topics in Wireless Communications

IEEE COMMUNICATIONS MAGAZINE (ISSN 0163-6804) is published monthly by The Institute of Electrical and Electronics Engineers, Inc. Headquarters address: IEEE, 3 Park Avenue, 17th Floor, New York, NY 10016-5997, USA; tel: +1-212-705-8900; http://www.comsoc.org/~ci. Responsibility for the contents rests upon authors of signed articles and not the IEEE or its members. Unless otherwise specified, the IEEE neither endorses nor sanctions any positions or actions espoused in *IEEE Communications Magazine.*

ANNUAL SUBSCRIPTION: $23 per member per year included in Society fee. Non-member subscription: $160. Single copy $10 for members and $20 for nonmembers.

EDITORIAL CORRESPONDENCE: Address to: Editor-in-Chief, G.S. Kuo, National Chengchi Universiy, Taipei, Taiwan 11623; tel: +886 2 86617453, fax: +886 2 86617432, e-mail: gskuo@ieee.org.

POSTMASTER: Send address changes to *IEEE Communications Magazine*, IEEE, 445 Hoes Lane, Piscataway, NJ 08855-1331. GST Registration No. 125634188. Printed in USA. Periodicals postage paid at New York, NY and at additional mailing offices. Canadian Post International Publications Mail (Canadian Distribution) Sales Agreement No. 264075.

SUBSCRIPTIONS, orders, address changes—IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08855-1331, USA; tel: +1-732-981-0060; e-mail: address.change@ ieee.org.

ADVERTISING: Advertising is accepted at the discretion of the publisher. Address correspondence to: Advertising Manager, *IEEE Communications Magazine*, 305 East 47th Street, New York, NY 10017-2394, USA.

SUBMISSIONS: The magazine welcomes tutorial or survey articles that span the breadth of communications. Submissions will normally be approximately 4500 words, with no mathematical formulas, accompanied by up to six figures and/or tables, with up to 10 carefully selected references. Electronic submissions are preferred, and should be sent to the Senior Technical Operations Editor at lmcrogl@lmc.ericsson.se, or four copies by mail to: Roch H. Glitho, Senior Technical Operations Editor, Ericsson Research Canada, 8400 Decarie Blvd., Town of Mount Royal, Quebec, H4P 2N2 Canada. All submissions are subject to review.

Experiments and Enhancements for IP and ATM Integration: The IthACI Project

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ABSTRACT

IthACI has been a European project in the ACTS framework concentrating on fast layer 2 forwarding methods for IP traffic based on labeled flow mechanisms. The approach is also known as IP switching and is considered promising for enhancing IP performance. Several flavors of IP switching have been proposed by various vendors (e.g., IP Switching by Ipsilon, Tag Switching by Cisco, ARIS by IBM, IPSOFACTO by NEC), all of them different and not interoperable. IP Switching has been adopted by the IETF under the umbrella of Multi-Protocol Label Switching (MPLS).[1] Although MPLS has made remarkable progress recently, a number of issues remain largely open for further investigation. The scope of the IthACI project was to address such issues and propose solutions. The issues addressed were multicast, QoS, resource management, and mobility support in a multicast environment. IthACI conducted both theoretical and experimental work. Three network islands, each based on a different flavor of IP switching, were set-up and the interoperability of these different IP switching/MPLS flavors were investigated and demonstrated.

INTRODUCTION

Since its inception around 1990, asynchronous transfer mode (ATM) network technology has been regarded as an antipode to existing Internet Protocol (IP) technology. ATM has started being deployed by traditional voice carriers (telephone companies), while IP is deployed by carriers of data traffic. ATM is considered to be fast, but complex, expensive, and ineffective for short-lived applications, mainly due to its connection-oriented nature. IP is regarded as simple, but missing QoS functionality and resulting in slow speeds due to the implementation routing functionality in software. Efficient methods for combining IP and ATM technology and transporting IP traffic over ATM backbone infrastructure have been considered. The result is known as "IP Switching" — a kind of IP router with IP protocol functionality that employs ATM hardware for efficient data forwarding.

Originally, various flavors of IP Switching were proposed: Ipsilon IP Switching, Cisco Tag Switching, IBM ARIS, Toshiba CSR, NEC IPSOFACTO, just to name a few. This prompted the Internet Engineering Task Force (IETF) to address a standardized approach through a working group on multiprotocol label switching (MPLS).

IthACI [1] (*I*nternet and *the* ATM: *C*onvergence and *I*ntegration) was a European Advanced Communications Technologies and Services (ACTS) project, which ran from March 1998 to Dec 1999 with the overall scope to evaluating and contributing to the different technologies that permit the efficient transport of IP traffic over, private or public, ATM backbone infrastructure. In this context, the project addressed the requirements for efficient IP multicasting, accommodation of QoS demands, mobility in a multicast environment, and resource management. It subsequently undertook enhancements of existing IP switching solutions with respect to the previous features, and generated recommendations based on experience gained from implementation and experimentation.

Besides the functional enhancements, the project's main goal was to influence the actual standardization process in the area of IP switching, and thus to work within and bring the pro-

[1] *The terms MPLS and IP switching are used interchangeably throughout*

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