ITU KALEIDOSCOPE
NANJING 2017
Challenges for a data-driven society

CLOSING PLENARY

Chaesub Lee
Director, Telecommunication Standardization Bureau, ITU

Alessia Magliarditi
ITU Kaleidoscope Coordinator

Nanjing, China
27-29 November 2017

ITU Kaleidoscope Academic Conference 2017

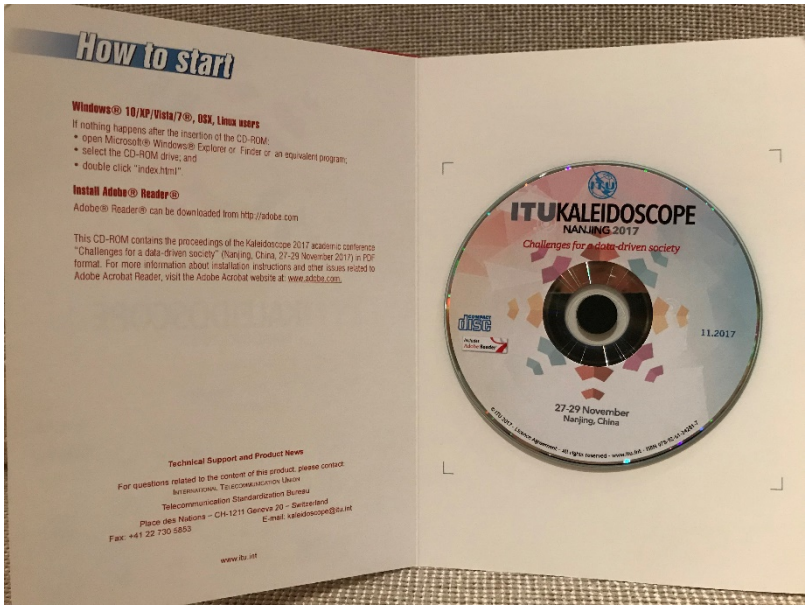
- 63 papers submitted for review from 22 countries
- 23 papers (17 Lecture/6 Poster) accepted for publication and presentation from 14 countries (almost all from academic institutions)
- Acceptance ratio: 35%
- 1 Invited paper
- 3 Keynote speakers
- 2 special sessions
- 1 tutorial
- 302 participants from 26 countries
- 20 remote participants

Local Universities Exhibit

Showcase of academic research, special projects, and literature on innovative approaches to data management and analysis, encouraging the development of data-driven applications and services of benefit to society.

- **Exhibitors**:
  - Nanjing University of Posts and Telecommunications (NJUPT), China
  - Competition Law Center, University of International Business and Economics (UIBE), China

Proceedings
Selected and presented papers



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features in the

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ITU KALEIDOSCOPE
NANJING 2017

Challenges for a data-driven society

SERIES EDITORIAL

THE FIRST ITU-T KALEIDOSCOPE EVENT: "INNOVATIONS IN NGN"

Yoichi Maeda — Mostafa Hashem Sherif

The Feature Topic of this issue is about the first International Telecommunication Union — Telecommunication Standardization Sector (ITU-T) Kaleidoscope event that took place in Geneva, Switzerland on 12–13 May 2008. This was an academic conference on "Innovations in NGN (Next Generation Networks)" that brought together over 220 participants from 48 countries, including students and professors from 43 academic institutions.

In organizing this conference, the goals of the ITU-T were to increase collaboration among academia and experts working on the standardization of information and telecommunications technologies (ICTs) to identify possi- of the NGN that may require standardiza- ence was technically co-sponsored by the ications Society, and the *Proceedings* are ectronically via IEEE Xplore. Cisco Sys- otal of US$10,000 for the three best paper ely $5000, $3000 and $2000). Other spon- the International Communications Foun- lapan, and Sun Microsystems. papers were submitted and underwent a r review process. Each proposal received ll paper reviews. The three best papers m nine nominations following the presen-

Communications Society, gave a keynote presentation on IEEE standards and future collaborations between the ITU-T and the IEEE in the area of standardization. Three papers were invited for each track of the conference. For Track 1, this paper was "A New Generation Network — Beyond NGN" by Professor Tomonori Aoyama, Research Institute for Digital Media and Content, Keio University, Japan. Track 2's invited paper was by Dr. Martin Körling from Ericsson on "Evolution of Open IPTV Standards and Services." The invited paper for track 3 was "Open Standards: A Call for Action" by Mr. Ken Krechmer, University of Colorado.

This issue of the Standards Series contains updated versions of the winning papers and two of the three invited papers. The first article, "A New Generation Network:Beyond the Internet and NGN" by Tomonori Aoyama, describes the requirements and fundamental technologies to provide a new generation network beyond the Internet and the next generation network (NGN), both of which are based on IP protocols. Although the Internet has grown into a social infrastructure, and the NGN is expected to replace both legacy telephone networks and cellular phone networks in the near future, there are many technological, economic, and societal factors pushing the

SERIES EDITORIAL

THE SECOND ITU-T KALEIDOSCOPE CONFERENCE: "INNOVATIONS FOR DIGITAL INCLUSION"

Simão Ferraz de Campos Neto — Yoichi Maeda — Mostafa Hashem Sherif

This Standards section presents selected articles from the second International Telecommunication Union — Telecommunication Standardization Sector (ITU-T) Kaleidoscope Academic Conference, which was technically co-sponsored by the IEEE Communications Society and took place in Mar del Plata, Argentina, 31 August–1 September 2009. The conference focus was on the role that standards play in "Innovations for Digital Inclusion."

The selection illustrates the reciprocal influences of technological innovations and standardization as they relate to various aspects of digital inclusion. It comprises two sets of articles: invited and awarded. The first invited paper, by Richard Stallman, founder of the GNU Linux project and now President of the Free Software Foundation, asked two fundamental questions: "Is Digital Inclusion a Good Thing? How We Can Make Sure It Is?" These questions set the tone of the conference, and stimulated many interesting discussions in the session where it was presented and during coffee breaks (some of the exchanges are available at http://www.sabermenos.com.ar/richard-stallman-en-mar-del-plata). The gist of the argument is that digital inclusion should not be at the expense of privacy rights and freedom of choice, a side-effect that many technologists tend to overlook. Discussions turned around whether the proposed solution (using free, i.e., untethered or libre, software) would fit current business models and the pressures for shorter development cycles.

The provocative title of the second article, by Erkki Sutinen, from the University of Joensuu, Finland, "Technology for Losers: Re-Equipping The Excluded," was meant to shake up patronizing and condescending attitudes toward "losers." These people are marginalized because of unemployment, special needs, poverty, or lack of development. In other words, they are those who, for any number of reasons, have been deprived of something valuable they possessed. From that perspective, losers are the majority of humanity. To work with and for losers, the author proposes that designers learn how to focus on urgent, relevant, and concrete problems, and to supplement needs-based requirements with a strength-based approach.

The final invited article, by Louis Masi and Dawn Tew, "Interplay and Implications of Intellectual Property and Academic-Industry Collaboration to Foster Digital Innovation," summarizes lessons that IBM, together with the Kauffman Foundation, has learned from experimentation with new styles of collaboration. The authors offer 10 key points to guide and challenge the academic and industrial communities into thinking of innovative ways to accelerate economic development for all.

The remaining articles are revised versions of contributions chosen by an award committee to share a prize of $10,000 funded by Nokia and Cisco Systems. The committee included representatives of both industry and universities, whose names and affiliations are listed in alphabetical order: Thoru Asami (University of Tokyo, Japan), Kai Jakobs (RWTH Aachen University, Germany), Louis Masi (IBM, USA), Helmut Schink (Nokia Siemens Networks, Germany), and Erkki Allan Sutinen (University of Joensuu, Finland). The committee was chaired by Mostafa Hashem Sherif (AT&T, USA).

The original intention was to have three prizes only. However, after reviewing the articles and evaluating the actual presentations, it was decided to share the second prize among three papers that were deemed of equal quality and relevance to the theme of the conference.

The first prize went to Kazaura *et al.* for the article entitled "ReFSO: A Universal Platform for Convergence of Fiber and Free-Space Optical Communication Networks." This is a description of a joint project by Waseda and Osaka Universities, both in Japan, regarding the use of analog/digital radio frequency (RF) signals over fiber and free-space optics (FSO) links. Based on their experimental results, the authors consider that FSO offers a viable alternative for high-speed data transmission in rural and remote areas, and over difficult terrainsm

GUEST EDITORIAL

THE THIRD ITU KALEIDOSCOPE CONFERENCE: "INNOVATIONS FOR DIGITAL INCLUSION"

Mostafa Hashem Sherif — Yoichi Maeda — Stefano Polidori

This Standards section contains selected papers from the third International Telecommunication Union Telecommunication Standardization Sector (ITU-T) Kaleidoscope Academic Conference, organized with the technical co-sponsorship of the IEEE Communications Society. The aim of the Kaleidoscope conference series is to identify emerging developments in information and communication technologies (ICTs) at an early stage to generate successful products and services through the development of international and open standards.

The 2010 conference took place at the Narhe Campus, Pune, Maharashtra, India, 13–17 December. It was hosted by the Sinhgad Technical Education Society (STES), at the invitation of the Ministry of Communications and Information Technology of India. The local partners, the Global ICT Standardization Forum for India (GISFI), the ITU-APT Foundation of India, and the CMAI Association of India were successful in increasing awareness of the event; 79 percent of the audience was from India. In addition, several Indian institutions contributed to an exhibit that paralleled the conference: Anna University, MIT Campus, Chennai; Telecom Centres of Excellence, New Delhi; College of Engineering (COEP), Pune; Sinhgad College of Engineering, Sinhgad Technical Education Society, Pune; Bharati Vidyapeeth Deemed University, Pune; and MIT School of Telecom Management, Pune.

Three other ITU events took place in parallel with the conference: the ITU IPTV Global Standards Initiative[1] (IPTV-GSI), 13–17 December, and the ITU IPTV Interoperability event, 14–17 December, as well as an IPTV Workshop on 17 December. The workshop included a panel moderated and broadcast by Bloomberg TV with a "Bollywood" producer among the panelists. In addition, the Global ICT Standardization Forum for India (GISFI) had their meeting on 13–15 December, while the European MyFIRE project had theirs on 16–17 December. Finally, a Standardization Tutorial was organized for the conference attendees on 16 December 2010.

The *IPTV interoperability event* is a response to resolutions from the ITU-D (Development Sector) to assist developing countries in selecting equipment from multiple vendors and ensure that they can work together to provide IPTV services. This was the third such event; the previous two took place in Geneva and Singapore. This time, however, the participant companies were restricted to Japanese and Korean manufacturers, and their number was low (4), because their Chinese counterparts experienced visa difficulties. *GISFI* (http://www.gisfi.org) is a new public-private partnership that started in 2009 to provide a neutral ground for all Indian stakeholders to harmonize their position in the knowledge-based economy [1]. The project *MyFIRE* is funded by the European Union to develop the use of experimental facilities in Europe and increase awareness of best practices in testing. The framework is interdisciplinary, engaging network researchers with experts from key areas of sociology, policy makers, economic models, and standardization. The *CMAI Association of India* is a professional association for the promotion of the Indian IT and telecom sector (http://www.cmai.asia). Lastly, the *ITU-APT Foundation of India* is an Indian society related to activities concerning research and study on telecommunications with special emphasis on rural development (http://itu-apt.org).

The conference title was "Beyond the Internet?—Innovations for Future Networks and Services." Judging by the number of similar activities on that subject, this seems to be a pressing issue. One possible reason is that the original architecture of the Internet was based on the so-called end-to-end argument: that the final decisions should be

[1] *See http://www.itu.int/en/ITU-T/gsi. Other ITU global standard initiatives concern Next Generation Networks (NGN-GSI) and the Internet of Things (IoT-GSI).*

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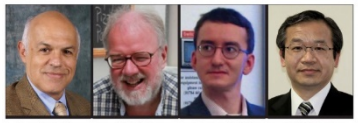
SERIES EDITORIAL

THE 4TH ITU KALEIDOSCOPE CONFERENCE "THE FULLY NETWORKED HUMAN? INNOVATIONS FOR FUTURE NETWORKS AND SERVICES"


Mostafa Hashem Sherif — Kai Jakobs — Martin Adolph — Yoichi Maeda

Kaleidoscope 2011 took place in Cape Town, South Africa, from December 12–14, 2011. This fourth event in the series focused on the central role of users of information and communication technologies (ICT). Accordingly, one of the aspects discussed was the adaptation of ICT to the African context (e.g., to monitor solar and climatic variations and to help microenterprises). Parallel with the conference, an exhibit of local universities organized by the International Telecommunication Union (ITU) Secretariat offered a glimpse into ICT activities in South Africa.

Of the 84 papers submitted for review, 30 were retained (21 for the lecture sessions and 9 for the poster session). The program consisted of contributions from 13 countries, many from Africa. The papers related to various aspects of ITU activities such as quality of service, cybersecurity, cloud computing, and other technologies associated with the Internet of Things (IoT). All papers are available from IEEE Xplore, and the conference proceedings can be downloaded from http://www.itu.int/oth/T2905000016en.

The attendees came from 23 countries: 127 delegates from academia, industry, and governmental institutions. The archived webcast of the event can be seen at http://www.itu.int/ITU-T/uni/kaleidoscope/2011/index.html.

Four papers shared the prize fund of US$10,000 provided by Nokia Siemens Networks and Telkom SA. Kai Jakobs (RWTH Aachen University, Germany) chaired the award committee, whose members were Martin Adolph (ITU), Armando Ferro (University of the Basque Country, Spain), Ian Graham (University of Edinburgh, United Kingdom), Yoshikazu Ikeda (Otani University, Japan), and Mostafa Hashem Sherif (AT&T, United States). The winning papers and two invited papers were considered for publication in the IEEE Communication Magazine. With the help of the 25 reviewers listed below, the article "Transmission Analysis of Digital TV Signals over a Radio-on-FSO Channel" by Ben Naila *et al.* was selected for this issue. This is an enhanced version of the paper that won the first prize. It presents an experimental evaluation of the performance of Japanese integrated services digital broadcasting-terrestrial (ISDB-T) TV signals over free space optical (FSO) links. The results show that an alternative way to provide broadband wireless connectivity in underserved areas is possible.

In a half-day tutorial, Professor Dr. Thomas Magedanz, TU Berlin/Fraunhofer Institute FOKUS, Germany, provided an overview of possible network evolutions, including emerging mobile broadband networks, and their impact on infrastructures and services. The related activities of FOKUS and its toolkits were described. The presentation can be downloaded from http://www.fokus.fraunhofer.de/en/ngni/downloads/_request/index.html. (A request for access to the download area of the tutorial slides must be filled to receive an email with the activated hyperlink).

The Jules Verne's Corner is a platform for more speculative ideas and views, looking far into the future. In this session, Roberto Saracco (Telecom Italia) speculated about the "The Disappearance of Telecommunications and the Fading of Boundaries among Atoms and Bits." The principal message was that at singularity points, prolonging trends can be misleading because what used to be true may no longer apply. Along the same lines, Professor Rias van Wyk, director of the Technoscan® Centre and Professor Extraordinaire at the University of Stellenbosch, South Africa, presented a functionality grid to construct an Atlas of technology that could help forecast and anticipate future technological developments. Professor van Wyk's presentation is available at http://www.itu.int/dms_pub/itu-t/oth/29/05/T29050000100003PDFE.pdf.

Kaleidoscope 2013 will convene at Kyoto University in Kyoto, Japan from 22–24 April 2013 around the theme of "Building Sustainable Communities." The deadline for paper submission is September 10, 2012. Additional information can be found at http://www.itu.int/ITU-T/uni/kaleidoscope/2013/index.html or by contacting the Kaleidoscope

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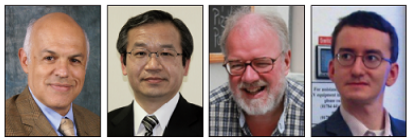
SELECTED PAPERS FROM THE FIFTH ITU KALEIDOSCOPE ACADEMIC CONFERENCE


Mostafa Hashem Sherif — Yoichi Maeda — Kai Jakobs — Martin Adolph

Join the online discussion group for this Series Topic here: http://community.comsoc.org/forums/commag-features-and-series

This Series presents selected papers from the ITU Kaleidoscope Academic Conference that convened in Kyoto, Japan from the 22nd to 24th of April 2013. The topic of the conference was "Building Sustainable Communities," in recognition of the challenges that Japan is facing after the Great East Earthquake. The hosts were the Ministry of Internal Affairs and Communication (MIC) of Japan and Kyoto University. Kyoto University is the second oldest Japanese national university after the University of Tokyo. It was founded in 1897 following the Meiji Restoration, which adopted various western systems to build a modern state.

Telekom South Africa). This financial support provided a prize fund totaling U.S. $10,000 awarded to the three best papers. Research in Motion (RIM) donated two BlackBerry PlayBook tablets that were given to the authors of the best student papers.

The first prize of U.S. $5000 was awarded to the article entitled "Sustaining Life During the Early Stages of Disaster Relief with a Frugal Information System: Learning from the Great East Japan Earthquake." This article is a joint contribution from Japan and the United States, co-authored by Mihoko Sakurai, Jiro Kokuryo (Keio University, Japan); Richard Watson (University of Georgia,

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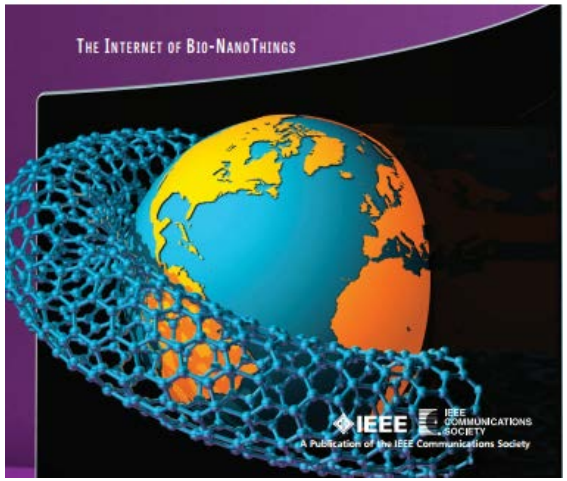

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3D CHANNEL MODEL IN 3GPP
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CLOUD ARCHITECTURE FOR SENSOR CONTROLLING AND MONITORING
DESIGN OF A DYNAMIC MOBILE SENSOR NETWORK PLATFORM
ADAPTABILITY BETWEEN PAYMENT CARD PROCESSING NETWORKS

GUEST EDITORIAL

SELECTED PAPERS FROM THE SEVENTH ITU KALEIDOSCOPE ACADEMIC CONFERENCE


Mostafa Hashem Sherif — Kai Jakobs — Christoph Dosch — Martin Adolph

This issue of the *Communications Standards Supplement* includes updated versions of selected papers from the seventh International Telecommunications Union (ITU) Kaleidoscope Academic Conference. The conference took place in Barcelona, Spain, 9-11 December 2015, as part of the celebration of the ITU's 150th anniversary. The topic

Technology, Japan) and Tetsuya Kawanishi (Waseda University, Japan) was awarded the first prize of U.S. $5,000. The authors present five different transport technologies (digital radio over fiber, analog radio over fiber, intermediate frequency over fiber, radio on radio, and seamless fiber-wireless convergence) for future mobile

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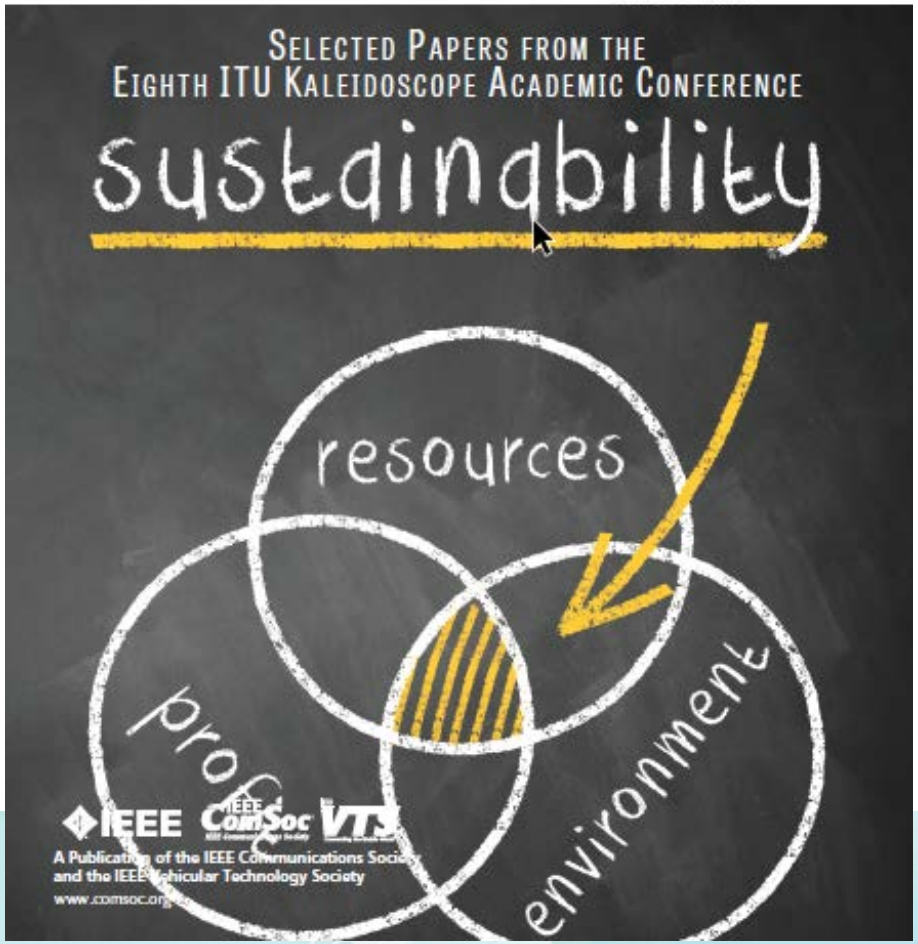

SERIES EDITORIAL

SELECTED PAPERS FROM THE EIGHTH ITU KALEIDOSCOPE ACADEMIC CONFERENCE

Mostafa Hashem Sherif | Kai Jakobs | Christoph Dosch | Martin Adolph

This issue consists of updated versions of presentations at the eighth International Telecommunication Union (ITU) Kaleidoscope Academic Conference. The conference took place in Bangkok, Thailand from 14–16 November 2016, in parallel with ITU Telecom World 2016. The topic of the conference was "ICTs for a Sustainable World" and the event was technically co-sponsored by the Institute of Electrical and Electronics Engineers (IEEE) and the IEEE Communication Society (IEEE ComSoc). Representatives from 31 countries participated in the conference.

The ITU Kaleidoscope series of academic conferences was started in 2008 to provide a forum for universities, industry and research institutions of different fields, to share knowledge about emerging ICT developments. Participants include researchers, academics, students, engineers, policymakers, regulators, innovators and even futurists. The theme of the next Kaleidoscope conference is "Challenges for a Data-Driven Society," and will take place in Nanjing, China from 27–29 November 2017.

The first paper is an update of a keynote by Mr. Simon Tuff, from the British Broadcasting Corporation (BBC), with the title "Important Considerations for Environmentally Sustainable Broadcasting: The British Broadcasting Corporation Experience." Mr. Tuff describes the various ways the BBC has approached the task of reducing the carbon footprint of its television broadcasting.

Three winning entries shared a total of 6000 CHF. The first prize of 3000 CHF was awarded to Bipiov Bhandari et al., from the Asian Institute of Technology, Thailand, and the Sahana Software Foundation, United States, for their work described in "Intricacies of Implementing an ITU-T X.1303 Cross-Agency Situational-Awareness Platform in Maldives, Myanmar, and the Philippines." The paper presents a broker system, based on the Common Alerting Protocol (CAP) of Recommendation ITU-T X.1303, that coordinates early warnings on natural disasters in the three mentioned countries. The broker takes into account the heterogeneity of the communication systems and the idiosyncrasies of various organizations. Currently, this paper is still in the review process, but interested readers can access the version presented at the conference at https://www.itu.int/en/publications/Documents/tsb/2016-ITUKaleidoscope/index.html#p=166 .

The second prize of 2000 CHF went to "Toward Authenticated Caller ID Transmission: The Need for a Standardized Authentication Scheme in Q.731.3 Calling Line Identification Presentation" by Huahong Tu, Adam Doupé, Ziming Zhao and Gail-Joon Ahn from Arizona State University, USA. The authors review some of the techniques for hacking the Internet Protocol (IP) to spoof the caller number in telephony. The solution they propose requires modification to Recommendation ITU-T Q.731.2, the current protocol for identifying the calling line in Signalling System No. 7 (SS7).

Kazuhide Nakajima, Takashi Matsui, Kosaro Saito, Taiji Sakamoto, and Noriyuki Araki from NTT Corporation, Japan, were awarded the third prize of 1000 CHF for their paper "Space Division Multiplexing Technology: Next Generation Optical Communication Strategy." They highlight the potential of space division multiplexing (SDM) in overcoming the capacity limitations of traditional single-mode fibers defined in Recommendation ITU-T G.652. They describe the geometry and the technology of 125-µm cladding of optical wiring for SDN using multicore fibers.

The program included two invited papers, updated versions of which are also in this issue. The first, by Nathalie Devillier, Grenoble École de Management, France, is titled "Aging, Well-Being and Technology: From Quality of Life Improvement to Digital Rights Management — A French Perspective." The author uses examples from the French legislation on the quality of life of the elderly to argue that a legal framework is necessary for balancing technical aspects with fundamental rights. The main point is that legal requirements and international standards and specifications have an important role in ICT applications and services, such as e-health, digital rights, and identity management.

The second article, by Luca Chiaraviglio et al., is a report by an international team from Europe, Africa, South America, and Australasia on a 5G network to serve rural and low-income areas. The design includes remote radio heads (RRHs) mounted on top of unmanned aerial vehicles (UAVs), large cells (LCs) to increase the coverage range and 5G-nodes powered by solar panels. The paper contains preliminary results from applications in Italy, the Cook Islands, and Zimbabwe.

Two more articles are included in this selection. The first article, "Scalable Directory Service for IOT Applications," is by Ved Kafle, Yusuke Fukushima, Pedro Martinez-Julia, and Hiroaki Harai from the Network System Research Institute, Japan. Their contribution concerns a high-performance and scalable directory service that can manage arbitrary information associated with the Internet of Things (IoT). Their solution is aligned with the ITU-T guidelines for future 5G scenarios and may also be helpful to the IETF Constrained RESTful Environments (CoRE) Working Group on service/resource discovery of IoT or machine-to-machine (M2M) applications.

Kaleidoscope 2017 special edition in the IEEE Communications Standards Magazine

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Other international Journals

Extended versions of selected papers can be considered for publication in the following Journals:

- **International Journal of Technology Marketing**
- **International Journal of Standardization Research**
- **Journal of ICT Standardization**

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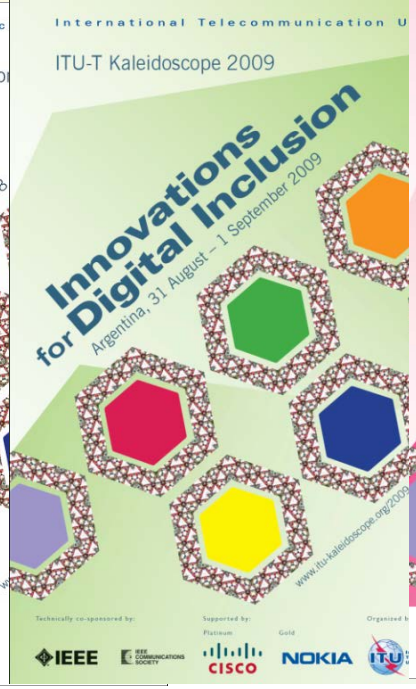
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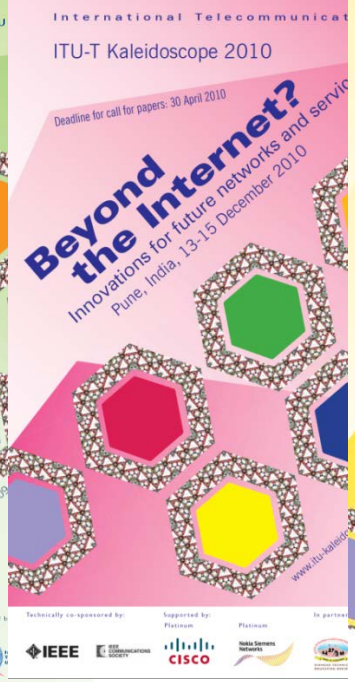
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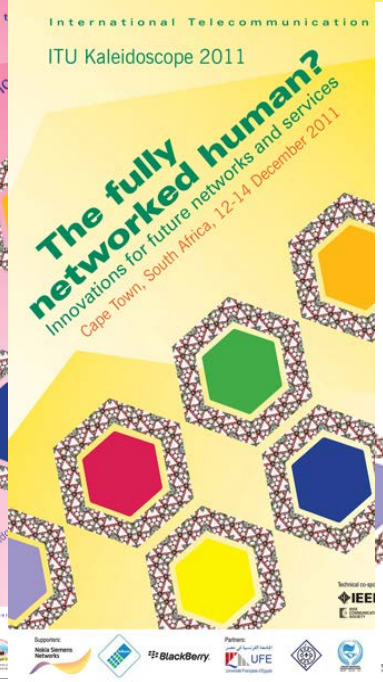
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ITU Kaleidoscope 2014
Living in a converged world
Impossible without standards?
St. Petersburg, Russian Federation, 3-5 June
IEEE
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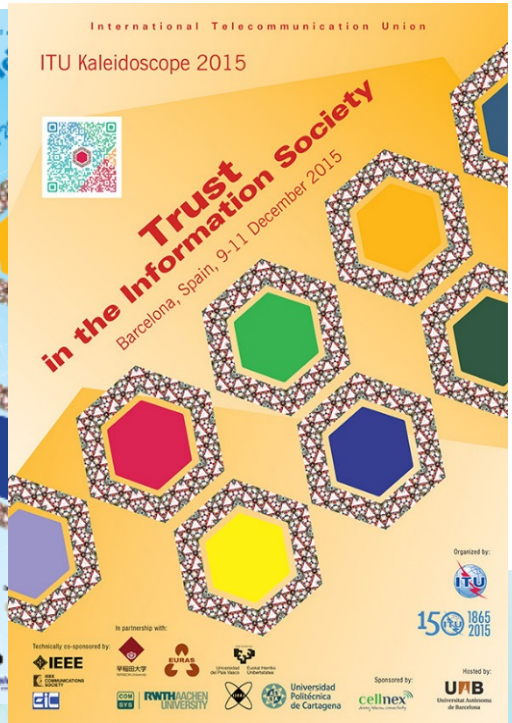
International Telecommunication Union
ITU Kaleidoscope 2015
Trust in the Information Society
Barcelona, Spain, 9-11 December 2015
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ITU KALEIDOSCOPE
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14-16 November 2016


ITUKALEIDOSCOPE
NANJING 2017
Challenges for a data-driven society
27-29 November
Nanjing, China

10th Kaleidoscope

- Hosted by UNIVERSIDAD TECNOLÓGICA NACIONAL
- Venue: Santa Fé de la Vera Cruz, Argentina
- Dates: 26-28 November 2018
- Theme: Machine Learning for Future Networks including 5G

University leaders

- **Mr. Yanfei Sun**, Executive Vice Director of Scientific and Research Department, Director of Natural Sciences Management Office
- **Ms. Ying Wang**, Director of Department of International Cooperation and Exchanges
- **Ms. Su Zhao**, Vice Director of Scientific and Research Department
- **Mr. Jinlong Zhu**, Vice Director of Scientific and Research Department
- **Ms. Xiefei Ge**, Vice Director of Department of International Cooperation and Exchanges
- **Ms. Meng'e Li**, Staff of Scientific and Research Department
- **Ms. Julia Zhu**, Staff of Department of International Cooperation and Exchanges
- **Mr. Yulong Zou**, Professor of School of Telecommunication and Information Engineering
- **Ms. Kejia Chen**, Associate Professor of School of Computer Science and Technology

ITUKALEIDOSCOPE
NANJING 2017
Challenges for a data-driven society

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Promotional support

THANK YOU!