

ITU KALEIDOSCOPE
ATLANTA 2019

Closing

Alessia Magliarditi

ITU Kaleidoscope Coordinator

4-6 December
Atlanta, Georgia, USA



ITU Kaleidoscope 2019 Programme Overview

- 38 research papers submitted for review from 18 countries
- 20 papers accepted for publication and presentation (majority from academic institutions) in 8 lecture sessions
- 4 Keynote speakers
- 2 invited papers
- 2 special sessions
- Approximately 61 participants from 16 countries
- Approximately 30 remote participants!

Conference Proceedings

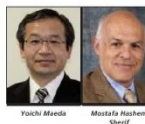
<http://itu.int/go/K-2019>

Direct link:

<https://www.itu.int/pub/T-PROC-KALEI-2019>

IEEE Xplore[®]
Digital Library

**Kaleidoscope features in the
IEEE Communications Standards
Magazine**



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

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 possible applications of the NGN that may require standardization. The conference was technically co-sponsored by the IEEE Communications Society, and the *Proceedings* are now available electronically via IEEE Xplore. Cisco Systems donated a total of US\$10,000 for the three best paper awards (respectively \$5000, \$3000 and \$2000). Other sponsors were Intel, the International Communications Foundation (ICF) of Japan, and Sun Microsystems. A total of 141 papers were submitted and underwent a double-blind peer review process. Each proposal received at least three full paper reviews. The three best papers were selected from nine nominations following the presentation of all papers, and a number of young authors were recognized. The awards recipients were:

- First prize: "Architecture and Business Model of Open Heterogeneous Mobile Network," by Yoshihiko Morita, Mitsuo Haraoka, Hiroyuki Murakami, Hiroshi

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 Kröling from Erlangen on "Evolution of Open IPTV Standards and Services." The invited paper for track 3 was "Open Standards: A Call for Action" by Mr. Ken Kretschmer, 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 barriers pushing the search for revolutionary network technologies and a clean-slate designed architecture beyond the IP structure.

The second article, "Open Standards: A Call for Change" by Ken Kretschmer, reviews the different needs of

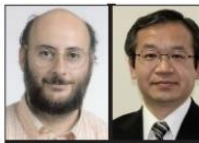
The third article, "The Architecture and a Business Model for the Open Heterogeneous Mobile Network" by Yoshihiko Morita, proposes revised architectures for IPTV/NGN that correspond to heterogeneous networks and open mobile markets, and present new business models. The mobile communications market has grown rapidly over the past 10 years, but the market may reach saturation in the foreseeable future. More flexible mobile networks able to meet various user demands and create new market openings are needed for further growth. Heterogeneous networks are more suitable than homogeneous networks for meeting a wide variety of user demands. There are two types of heterogeneous network: a closed type whose network resources are deployed and operated by communication carriers, and an open type whose network resources would be deployed not only by existing operators but also by companies, universities, and so on. It will be easy for newcomers to enter mobile businesses in an open heterogeneous mobile network, so many innovative services are likely to be provided through cooperation between various companies or organizations.

The fourth article, "Differential Phase Shift Quantum Key Distribution" by Hiroki Takeue, describes quantum key distribution (QKD), which has been studied as an ultimate method for secure communication and is now emerging as a technology that can be deployed in real fiber networks. The authors present their QKD experiments based on the differential phase shift QKD (DPS-QKD) protocol. A DPS-QKD system has a simple configuration that is easy to implement with conventional optical communication components, and is suitable for a high clock rate system. Moreover, although the DPS-QKD system is implemented with an attenuated laser source, it is inherently secure against strong eavesdropping attacks called photon number splitting attacks, which pose a serious threat to conventional QKD systems with attenuated laser sources. It also describes three types of single photon detectors that are suitable for high-speed long-distance QKD: an on-conversion detector, a superconducting single-photon detector, and a sinusoidally gated InGaAs avalanche photodiode. The article presents the recent best QKD experiments that employed those detectors.

The last article, "Open API Standardization for the NGN Platform" by Catherine Mallig, offers outlines the importance of open APIs, which currently exists in the standards bodies, and concludes with a brief set of issues standards bodies need to resolve in relation to these APIs.

SERIES EDITORIAL

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



Simão Ferraz de Campos Neto Yoichi Maeda Mustafa 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.sabermonos.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 software licensing where it is unentitled 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 Masé 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: Thora Asami (University of Tokyo, Japan), Kai Jakobs (RWTH Aachen University, Germany), Louis Masé (IBM, USA), Helmut Schink (Nokia Siemens Networks, Germany), and Erkki Allan Sutinen (University of Joensuu, Finland). The committee was chaired by Mustafa 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 Kazuura et al. for the article entitled "RoFSO: A Universal Platform for Convergence of Fiber and Free-Space Optical Communications Systems." 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 terrain

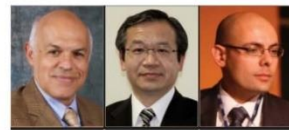
IEEE
Communications
 www.comsoc.org
 MAGAZINE

- Military Communications
- Traffic Management for Mobile Broadband Networks
- ITU Kaleidoscope Conference
- Integrated Circuits for Communications

Free ComSoc Tutorial: Engineering MIMO Cellular Networks See Page 9

GUEST EDITORIAL

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



Mustafa Hashem Sherif Yoichi Maeda Stefano Pallorini

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 Singhad 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; Singhad College of Engineering, Singhad Technical Education Society, Pune; Bhanu Vishvesh 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 (ITU-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 via 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>).

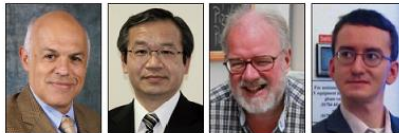
The conference title was "Beyond the Internet?—Innovations for Future Networks and Services." Judging by the number of similar activities on that subject, this seemed to be a pressing issue. One possible reason is that the original architecture of the Internet was based on the so-called end-to-end argument: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

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

- LTE Update
- Optical Communications
- ITU-T Standards: Innovations for Digital Inclusion

Free ComSoc Tutorial—4G See Page 9

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.

Kyoto was the capital of Japan from 794 to 1868. The historical city has many interesting sites (temples, shrines, gardens, palaces). The conference venue was the Clock Tower, International Conference Hall of Kyoto University.

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. \$5,000 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, Iiro Kokuryo (Keio University, Japan); Richard Watson (University of Georgia, United States); and Chon Abraham (College of William and Mary, United States). The topic is related to the work of the ITU-T Focus Group on Disaster Relief Systems, Network Resilience and Recovery (FG-DR&NR) and th emergency com-

at to Phillip H. Grifmation Security and m's several propoement of biometric with the security of ed interest in these ue. The article that 2000 was not ready am from Spain and hor is included. Its network for Future ork in progress to

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/kaleidoscope2011/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), Iain Graham (University of Edinburgh, United Kingdom), Yoshihiko Itochi (Osaka University, Japan), and Mostafa Hashem Sherif (AT&T, United States). The winning papers and two invited papers were considered for publication in the IEEE Communications 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 Neila 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.

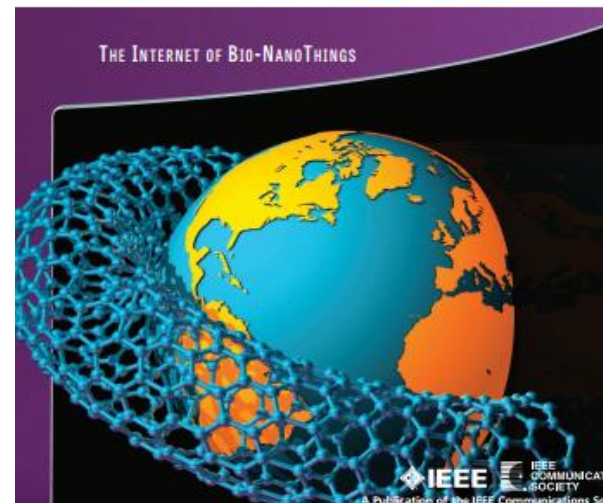
In a half-day tutorial, Professor Dr. Thomas Magendantz, TU Berlin/Fraunhofer Institute FOKUS, Germany, provided an overview of possible network evolutions, including emerging mobile broadband networks, and their impact on infrastructures and services. The related activities of FOKUS and its toolkits were described. The presentation can be downloaded from http://www.loks.fraunhofer.de/eng/download_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 "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 technoplate that could help forecast and anticipate future technological developments. Professor van Wyk's presentation is available at <http://www.itu.int/oth/t2905/2013/T2905000100030DFE.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/kaleidoscope2013/index.html> or by contacting the Kaleidoscope

Advances in Network Planning
 Fixed Networks and Cloud
 Ad Hoc and Sensor Network
 Network and Service Management
 Selected Papers from ITU Kaleidoscope

UNIFIED CONTROL PLANE: CONVERGED POLICY AND CHANGING CONTROL
 3D CHANNEL MODEL IN 3DPP
 STANDARDS FOR TRENCH OPTICAL WIRELESS COMMUNICATIONS
 CLOUD ARCHITECTURE FOR SECURE 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 over radio, and seamless fiber-wireless convergence) for future mobil-

SELECTED PAPERS FROM THE EIGHTH ITU KALEIDOSCOPE ACADEMIC CONFERENCE

sustainability



SELECTED PAPERS FROM THE EIGHTH ITU KALEIDOSCOPE ACADEMIC CONFERENCE



Mostafa Hashem Sherif

Kai Jakobs

Christoph Dusch

Martin Adolph

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

The Kaleidoscope series of academic conferences was established in 2008 to provide a forum for universities, industry and researchers from different fields, to share knowledge about ICT developments. Participants include researchers, students, engineers, policymakers, regulators, innovators and futurists. The theme of the next Kaleidoscope Academic Conference is “Challenges for a Data-Driven Society,” and will be held in Nanjing, China from 27–29 November 2017.

The first paper is an update of a keynote by Mr. Simon Tuff, Director of the British Broadcasting Corporation (BBC), with the title “Considerations for Environmentally Sustainable Broadband: 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, winning entries shared a total of 6000 CHF. The first 2000 CHF was awarded to Biplov Bhandari et al., from Institute of Technology, Thailand, and the Sahara Foundation, United States, for their work described in “Design of Implementing an ITU-T X.1303 Cross-Agency Awareness Platform in Maldives, Myanmar, and the UK.” The paper presents a broker system, based on the Alerting Protocol (CAP) of Recommendation ITU-T X.1303, that coordinates early warnings on natural disasters in mentioned countries. The broker takes into account the heterogeneity of the communication systems and the idiosyncratic organizations. Currently, this paper is still in the draft stage, but interested readers can access the version presented at the conference at <http://www.itu.int/itu-t/publications/standards/2016-ITU-Kaleidoscope/index.html#p=166>.

The second prize of 2000 CHF went to “Toward Authenticated ID Transmission: The Need for a Standardized Authentication Scheme in Q.731.3 Calling Line Identification (CLID)” by Huahong Tu, Adam Doupe, Ziming Zhao and Aihua 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. The authors also discuss the impact of this change on the Signalling System No. 7 (SS7).

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 1.9- 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 Ecole 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 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.

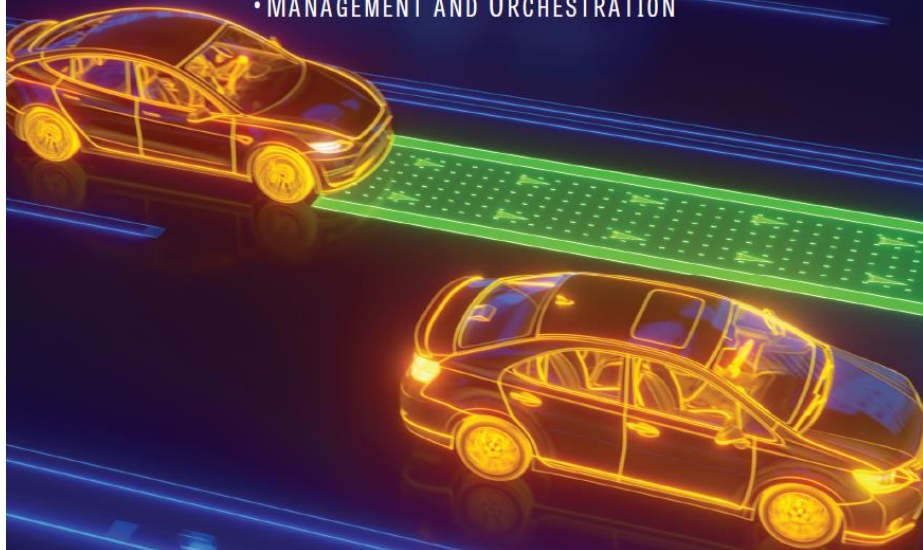
The second article, by Luca Chiaraviglio et al., is a report by an international team from Europe, Africa, South America and Australasia on a 5G network to serve rural and low-income areas. The design includes remote radio heads (RRHs) mounted on top of unmanned aerial vehicles (UAVs), large cells (LCs) 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,” by Ved Kalle, Yusuke Fukushima, Pedro Martinez-Julia, and Hiroaki Harai from the Network System Research Institute, Japan. Their contribution concerns a high-performance 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 Conserved RESTful Environments (CoRE) Working Group on service/resource discovery for IoT or machine-to-machine (M2M) applications.

ROUTE GUIDANCE USING THE INTERNET OF VEHICLES

ALSO IN THIS ISSUE:

- SELECTED PAPERS FROM THE NINTH ITU KALEIDOSCOPE
- WIRELESS AND RADIO COMMUNICATIONS
- MANAGEMENT AND ORCHESTRATION



4-6 December
Atlanta, Georgia, USA

SERIES EDITORIAL

SELECTED PAPERS FROM THE NINTH ITU KALEIDOSCOPE ACADEMIC CONFERENCE



Mostafa Hashem Sherif Kai Jakobs Christoph Dosch Alessia Magliarditi Stefano Poikori

The selections in this special section update presentations at the ninth International Telecommunication Union's (ITU) Kaleidoscope Academic Conference. The conference took place in Nanjing, Jiangsu Province, China from 27–29 November 2017, on the theme “Challenges for a Data-Driven Society.” Representatives from 26 countries participated in the event, which was technically co-sponsored by the IEEE and the IEEE Communication Society (IEEE ComSoc). The Conference Proceedings are available on the ITU website at <https://www.itu.int/en/publications/Documents/tsb/2017-ITU-Kaleidoscope/index.html>, and also from the IEEE Xplore Digital Library. Pictorial highlights from the conference are available at <https://www.flickr.com/photos/itupictures/sets/72157690471990724>.

The ITU Kaleidoscope series of academic conferences started in 2008 to provide a forum on developments in the information and communication technologies (ICT) that could be relevant to future standards. Participants include researchers, academics, students, engineers, policymakers, regulators, and futurists from universities, industry, and research institutions. The 2018 Kaleidoscope conference took place in Santa Fe, Argentina, from 26 to 28 November, with the theme “Machine Learning for a 5G Future,” and selected papers from that conference are scheduled to be published in the September 2019 issue of this magazine.

The first article, “A Holistic Approach to Exploring the Divided Standards Landscape in e-health Research,” is an updated version of the entry that won the best paper award at Kaleidoscope 2017. Its authors are Doyoung Eom and Heejin Lee from Yonsei University, Korea. The article presents a synthetic view of e-health standards, organized around three themes: use and harmonization, types and roles, and adoption. A major contribution is the identification of the gaps in current standards that prevent the seamless interoperability of e-health records at the international level.

The title of the second article is “The IEEE 1906.1 Standard: Some Guidelines for Strengthening Future Normalization in Electronic Magnetic Nano-Communications,” by

Sebastian Canovas-Carrasco, Antonio-Javier Garcia-Sanchez, and Joan Garcia-Har from the Universidad Politécnica de Cartagena, Spain. IEEE 1906.1 is a conceptual standard intended as a starting point for future developments in nanoscale communications. Based on the latest version of IEEE 1906.1, the authors provide recommendations on what needs to be considered to enhance electromagnetic and molecular nanoscale communications.

The final selection is from the National Institute of Information and Communications Technology, Japan. The title is “Adaptive Virtual Network Slices for Diverse IoT Services,” and it is authored by Ved Kafle, Yusuke Fukushima, Pedro Martinez-Julia, Takaya Miyazawa, and Hiroaki Harai. This contribution describes how virtualized resources can be dynamically allocated to network slices to ensure that each slice meets the quality of service (QoS) requirements of a given category of Internet of Things (IoT) services. The authors present preliminary results for the on-demand allocation and dynamic adjustment of resources in scalable virtualized network systems. In particular, they consider three types of scalability: horizontal scaling by adjusting the number of virtualized network nodes and servers; vertical scaling by adjusting the virtualized resources allocated to a network function; and internetwork scaling by the arbitration of limited resources among many network slices. Final results from the research will be submitted to standards development organizations such as the ITU and the Internet Engineering Task Force (IETF).

In closing, the Editors would like to express their gratitude to the reviewers, listed below in alphabetical order, for their assistance in making the selections and for their generous advice to the authors of the various submissions.

Reviewer	Affiliation
Abu Ali, Najah	United Arab Emirates University, UAE
Adolph, Martin	International Telecommunication Union, Switzerland
Akçayır, Murat	Kırıkkale Üniversitesi, Turkey
Alomáiny, Akram	Queen Mary University London, UK

Kaleidoscope 2019 special edition
in the IEEE Communications Standards Magazine
September 2020 issue

For submissions:

1. Please read the guidelines:

<http://www.comsoc.org/commag/author-guidelines>

2. Please go to

<https://mc.manuscriptcentral.com/m-comstd>

Deadline: 15 March 2020

Contact: Mostafa Hashem Sherif – Kaleidoscope TPC Chair

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**

ITU Journal

ICT Discoveries

- Launched in 2017, scholarly, professional, peer-reviewed, digital, online publication.
- It publishes original research on ICT and also features review articles, best practice implementation tutorials and case studies.
- It covers technical developments and their policy and regulatory, economic, social and legal dimensions.
- The interdisciplinary approach of the Journal reflects the ITU's comprehensive field of interest.

ITU KALEIDOSCOPE

ATLANTA 2019

ITU Journal
ICT Discoveries
Volume 1, No.1, March 2018



First special issue on

The impact of Artificial Intelligence on communication networks and services

ITU Journal
ICT Discoveries

Special issue
**Propagation modelling
for advanced future radio systems –
Challenges for a congested radio spectrum**



ITU Journal
ICT Discoveries

Volume 1, No.2, December 2018

Second special issue on

Data for Good



4-6 December
Atlanta, Georgia, USA





Paper submission deadline extended: 11 December 2019

ITUKALEIDOSCOPE
ATLANTA 2019

Our sincere **thanks** goes to.....

4-6 December
Atlanta, Georgia, USA



Host University



Atlanta Global Studies Center
Center for Computing and Society
Center for Health and Humanitarian Systems
Center for International Strategy, Technology, and Policy
Center for Serve-Learn-Sustain
Georgia Tech Research Institute
Institute for People and Technology

Collaborator



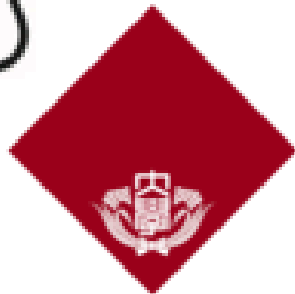
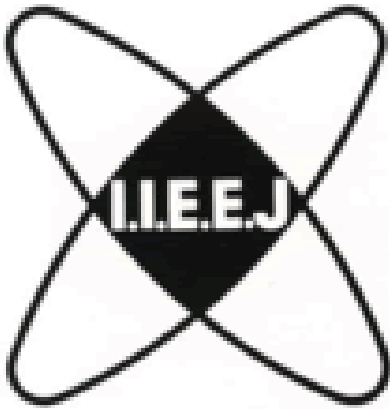
**World Health
Organization**

Technical co-sponsors



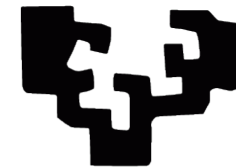
THE LANCET
Digital Health

Partners



早稲田大学
WASEDA University

eman ta zabal zazu



Universidad
del País Vasco

Euskal Herriko
Unibertsitatea

General Chairman

Chaouki Abdallah, Georgia Institute of Technology, USA

Host Committee

Co-chairs: Michael Best and Elizabeth Mynatt

Jennifer Hirsch

Pinar Keskinocak

Leigh McCook

Sebnem Ozkan

Alasdair Young

All the local volunteers!

My sincere **thanks** also
goes to.....

ITU KALEIDOSCOPE

ATLANTA 2019



Alessia Magliarditi
ITU Kaleidoscope
Coordinator



Emer Windsor
Kaleidoscope
Executive Assistant



Erica Campilongo
Kaleidoscope Collaborator

Gent Bajrami
IT Support



Simiso Dlodlo
Kaleidoscope
Collaborator



Marine Kern
Kaleidoscope
Collaborator



Pascal Borde
Promotional support

4-6 December
Atlanta, Georgia, USA



Eleven ITU Kaleidoscope
conferences have been
organized worldwide



ITU KALEIDOSCOPE

ICTs for a Sustainable World

The 8th ITU Kaleidoscope academic conference



ITU KALEIDOSCOPE

NANJING 2017

Challenges for a data-driven society

27-29 November

10th ITU ACADEMIC CONFERENCE

ITU KALEIDOSCOPE

SANTA FE 2018

26-28 November
Santa Fe, Argentina

*Machine learning
for a 5G future*

11th ITU ACADEMIC CONFERENCE

ITU KALEIDOSCOPE

ATLANTA 2019

*ICT for Health:
Networks, standards
and innovation*

4-6 December
Atlanta, USA

ITU KALEIDOSCOPE

ATLANTA 2019

12TH ITU ACADEMIC CONFERENCE

ITU KALEIDOSCOPE

HA NOI 2020

*Industry-driven
digital transformation*

7-9 September
Ha Noi, Viet Nam

4-6 December
Atlanta, Georgia, USA



ITUKALEIDOSCOPE
ATLANTA 2019

Best Paper **Awards** and **Young Author** Recognition **Ceremony**

4-6 December
Atlanta, Georgia, USA



Award Committee

Four distinguished conference attendees

- **AC Chair:** Alessia Magliarditi, ITU Kaleidoscope Coordinator

- **AC Members:**
 1. Antoine Bagula, University of the Western Cape, South Africa
 2. Mostafa Hashem Sherif, Kaleidoscope Steering Committee Member and TPC Chair
 3. Jian Song, Tsinghua University, China
 4. Duncan Sparrell, Consultant, USA

Best Paper Awards

- **First** paper: ITU Certificate + USD 3 000.-
- **Second** paper: ITU Certificate + USD 2 000.-
- **Third** Paper: ITU Certificate + USD 1 000.-

Criteria

- 1 – Clarity
- 2 – Relevance to the conference theme
- 3 – Relevance to standards

- 4 – Presentation

Six nominees

- ❑ Best ranking papers that were recommended for best paper award by the Technical Programme Committee (double-blind/peer-review process) and Steering Committee.

- ❑ **Six candidates**
 - ❑ Five in **Track 2** (ICT applications and services for health)
 - ❑ One in **Track 3** (Social, economic, legal, ethical and policy aspects of ICT for health)

Nominated papers and presenters

S2.1 Module structure for foot prosthetic and interface standardization

Yoshitoshi Murata, Iwate Prefectural University, Japan; and Tomoki Yamato, DOCOMO Technology, Inc., Japan

S4.2 Redesigning a basic laboratory information system for the global south

Jung Wook Park, Aditi Shah, Rosa I. Arriaga and Santosh Vempala, Georgia Institute of Technology, United States

S4.3 #RinginTheAlarm: Chronic "Pilotitis" stunts digital health in Nepal

Ichhya Pant, George Washington University School of Public Health, United States; and Anubhuti Poudyal, George Washington University School of Medicine and Health Sciences, United States

S5.1 Elderly health monitoring system with fall detection using multi-feature based person tracking

Dhananjay Kumar, Aswin Kumar Ravikumar and **Vivekanandan Dharmalingham**, Anna University, India; and Ved P. Kafle, National Institute of Information and Communications Technology, Japan

S6.2 Operationalizing data justice in health informatics

Mamello Thinyane, United Nations University, Macao SAR, China

S7.1 Thought-based authenticated key exchange

Phillip H. Griffin, Griffin Information Security, United States

And the winners are...

Third prize

Elderly health monitoring system with fall detection using multi-feature based person tracking

Presented by

Dhananjay Kumar
&

Vivekanandan Dharmalingham

Anna University, India

co-authored with

Aswin Kumar Ravikumar
Anna University, India

and

Ved P. Kafle

National Institute of Information and Communications Technology, Japan

Second prize

*Redesigning a basic laboratory information system for the
global south*

Presented by

Jung Wook Park

Georgia Institute of Technology, United States

co-authored with

*Aditi Shah, Rosa I. Arriaga and Santosh Vempala
Georgia Institute of Technology, United States*

First prize

Thought-based authenticated key exchange

Presented by

Phillip H. Griffin

Griffin Information Security, United States

3 Young Author Recognition certificates

Shayan Gupta, Carnegie Mellon University & Audition Technology, LLC, United States

S2.2 *Development of hearing technology with personalized safe listening features*

Rui Fu, University of Toronto, Canada

S5.2 *A healthcare cost calculator for older patients over the first year after renal transplantation*

Di Zhang, Zhengzhou University, P.R. China & Seoul National University, Korea

S1.1 *5G-enabled health systems: Solutions, challenges and future research trends*

CONGRATULATIONS!!!

ITU KALEIDOSCOPE

ATLANTA **2019**

Thank you!