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FEBRUARY 2014  
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VOLUME 45  
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## 2014 IEEE 15th International Conference on High Performance Switching & Routing Vancouver, British Columbia, July 1 to July 4, 2014

Vancouver is world renowned for its diversity of many cultures and ethnicities. It is an ideal place for scientists and engineers from around the world to gather and share their ideas.

With the unprecedented growth of the Internet as a backbone for communications and information services, it is essential that researchers gather to share their ideas and progress on solving the future challenges that the Internet faces. They include bridging the digital-divide and providing advantages of the Internet to developing

countries; handling the bandwidth and delay requirements of multimedia, P2P, and cloud computing applications; implementing IPv6 and migrating from IPv4; deploying large datacenters and enhancing their switching capabilities; and achieving energy efficiency of switching and routing equipment.

These are only a few of the topics that have demanded switching and routing capabilities that are more intelligent, efficient, and reliable than ever before.

### IEEE HPSR 2014 will address the following topics

- Architectures of high-performance switches and routers
- High-speed packet processors
- Address lookup algorithms
- Packet classification, scheduling, and dropping
- Switching, bridging, and routing protocols
- Latency and buffer control
- Multicasting
- P2P routing
- Routing in wireless, mobile and sensor networks
- Optical switching and routing
- Switching, bridging, and routing in data centers and clouds
- Software defined networking
- Data placement and migration
- Multiprocessor networks
- Network management
- Pricing, accounting, and charging
- QoS and scalability of switching, bridging, and routing
- Traffic characterization and engineering
- Power-aware switching, bridging, and routing protocols
- High-speed network security

### IMPORTANT DATES (extended deadlines)

Paper registration: February 16, 2014  
Full paper submission: February 23, 2014

Camera-ready due: May 4, 2014

Tutorial submission: March 2, 2014  
Acceptance notifications: April 6, 2014

General Chairs: Ljiljana Trajkovic (Simon Fraser University), Andrzej Jajszczyk (AGH University of Science and Technology)  
ED:06FEB14

<http://www.ieee-hpsr.org/>



Bill Dally  
Stanford and NVIDIA

## Efficiency and parallelism: The challenges of future computing

The computing demands of mobile devices, data centers, and HPC are increasing exponentially. At the same time, the end of Dennard scaling has slowed the rate of improvement and made all computing power limited, so that performance is determined by energy efficiency. With improvements in semiconductor process technology offering little increase in efficiency, innovations in architecture and circuits are required to maintain the expected performance scaling. The large scale parallelism and deep storage hierarchy of future machines poses programming challenges.

This talk will discuss these challenges of efficiency and parallelism in more detail and introduce some of the technologies being developed to address them.

Monday 03 February  
4:00 pm  
(Refreshments 3:30 pm)

Kaiser 2020/2030  
2332 Main Mall  
UBC

**Speaker:** William (Bill) Dally is chief scientist at NVIDIA and senior vice president of NVIDIA research. He is also Professor (Research) of Electrical Engineering and Computer Science at Stanford University. Dally first joined NVIDIA in 2009 after spending 12 years at Stanford University, where he was chairman of the computer science department and the Willard R. and Inez Kerr Bell Professor of Engineering.

Dally and his Stanford team developed the system architecture, network architecture, signaling, routing and synchronization technology that is found in most large parallel computers today.

Dally was previously at the Massachusetts Institute of Technology from 1986 to 1997, where he and his team built the J-Machine and M-Machine, experimental parallel computer systems that pioneered the separation of mechanism from programming models and demonstrated very low overhead synchronization and communication mechanisms. From 1983 to 1986, he was at the California Institute of Technology (Caltech), where he designed the MOSSIM Simulation Engine and the Torus Routing chip, which pioneered wormhole routing and virtual-channel flow control.

Dally is a cofounder of Velio Communications and Stream Processors. He is a member of the National Academy of Engineering, a Fellow of the American Academy of Arts & Sciences, a Fellow of the IEEE and the ACM. He received the 2010 Eckert-Mauchly Award, considered the highest prize in computer architecture, as well as the 2004 IEEE Computer Society Seymour Cray Computer Engineering Award and the 2000 ACM Maurice Wilkes Award. He has published more than 200 papers, holds more than 75 issued patents and is the author of two textbooks, "Digital Systems Engineering" and "Principles and Practices of Interconnection Networks."

Dally received a bachelor's degree in electrical engineering from Virginia Tech, a master's degree in electrical engineering from Stanford University and a PhD in computer science from Caltech.



Information  
Joint Computer  
Society Chair  
Stephen Makonin  
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A  
UBC Electrical and  
Computer Engineering  
colloquium and  
distinguished visitor  
event



The IBM Blue Gene/P supercomputer at Argonne National Lab runs over 250,000 processors using normal data center air conditioning, grouped in 72 racks/cabinets connected by a high-speed optical network



Barbara Frisken

Friday 14 February  
2:30 pm

Prince George campus  
Room: 5-174  
Library Building

**Information**  
Matt Ried  
IEEE UNBC Chair  
[mreid@unbc.ca](mailto:mreid@unbc.ca)

## Colloids in Space

Colloidal systems can be used to study many fundamental processes. We are using a colloid-polymer mixture, a standard system in soft matter physics, to study competition between phase separation and crystallization. The colloidal particles can be thought of as model atoms, where interactions can be tuned carefully by varying the molecular weight and concentration of the polymer. But gravity can affect formation of larger structure. In this talk I will discuss what we have learned from experiments on Earth and on the International Space Station in samples prepared in the three-phase region (gas-liquid-crystal) of the phased diagram of a colloid-polymer mixture.

**Speaker:** Barbara Frisken is Professor of Physics at Simon Fraser University. She completed her Ph.D. in physics at the University of British Columbia in 1989, and was a postdoctoral fellow at University of California, Santa Barbara, before joining the faculty at SFU in 1992. Her research interests include structural studies of soft matter systems aimed at understanding relationships between microstructure and bulk properties; current projects focus on proton-conducting polymer membranes and phase separation and crystallization in colloid/polymer mixtures. She is an experimentalist with expertise in scattering techniques, particularly light scattering but also x-ray and neutron scattering.



## UBC PhD candidate develops method to use local tv and radio channels to transmit emergency cellular signals

New research finds a way to opportunistically use television and radio channels to transmit cellular signals when systems are pushed beyond capacity. When a natural disaster strikes and too many people take to their mobile phones at once, cellular networks easily overload. But a University of British Columbia graduate student has developed a solution to ensure that calls don't get dropped and texts make it to their destination.

In a study published in the journal IEEE Transactions on Wireless Communications, Mai Hassan, a PhD student in the Department of Electrical and Computer Engineering, found a way to opportunistically use television and radio channels to transmit cellular signals when systems are pushed beyond capacity.

Mai Hassan "I proposed a more effective way to use any channel in the neighborhood, even if those channels are being used by radio or television stations," said Hassan. "The challenge was finding a way to make sure the cellular signals didn't interfere with the people using those channels in the first place."

Hassan's solution involved changing the shape of the wireless signal so she could transmit on channels that use radio or television



Mai Hassan

frequencies. She then had to change the direction of transmission away from the original channel. Instead of using traditional antennas, which transmit signals in all directions, she used smart antennas in mobile phones. Smart antennas transmit signals in a single direction and can steer the beam to any direction. By manipulating the direction of the cellular signals, Hassan was able to transmit calls and texts to a receiver while avoiding any interference with the original radio and televisions signals.

Professors Jahangir Hossain, in the School of Engineering at UBC's Okanagan campus, and Vijay Bhargava, in the Department of Electrical and Computer Engineering at UBC's Vancouver campus, supervised this research.



Jonathon Holzman

## Biofluid control and sensing: The integration of digital microfluidics and terahertz photonics technology

Biofluids are the reagents at the heart of many sensitivities are demanded, however, terahertz biochemical and biomedical applications—and the photonics technology can be an especially adept success of these applications is often linked to core approach for biofluid sensing. The long wavelengths of capabilities for biofluid control and sensing. Biofluid terahertz electromagnetic waves have significant control relates to reagent manipulation, and interactions with biological reagents, such as DNA for developments in recent years have shown that genetic analyses and proteins for proteomic analyses. microscopic lab-on-a-chip systems, using microfluidics technology, can provide effective biofluid Within this talk, our research developments for high-control with high throughputs and small reagent efficiency and small-scale terahertz sources are volumes.

Friday 31 January

2:30 pm

UNBC  
Prince George campus  
Room: 5-176  
Library Building

Within this talk, contemporary challenges of microfluidics are discussed, and it is shown that

emerging lab-on-a-chip systems, based on digital microfluidics technology, can overcome many of the long-standing issues for the integration of biofluid control. Our research findings on the underlying physics and architectures of digital microfluidic devices are presented. Biofluid sensing relates to the identification of biochemical signatures, and developments in recent years have shown that light-based systems, using photonics technology, can be effective spectral probes. When especially high

**Speaker:** Dr. Jonathan F. Holzman received his Ph.D. in Electrical Engineering at the University of Alberta in 2003. In 2004-2005, he carried out postdoctoral research on ultrafast photonics at the Swiss Federal Institute of Technology (ETH) in Zürich, Switzerland. He is now an Associate Professor in the School of Engineering at the University of British Columbia (UBC). He is the group leader of the Integrated Optics Laboratory and the Applied Micro and Nanosystems Facility at UBC's Okanagan campus

### Information

Matt Ried  
IEEE UNBC Chair  
[mreid@unbc.ca](mailto:mreid@unbc.ca)



## IEEE Vancouver AGM

Saturday 29 March  
Hilton Vancouver Metrotown

Reception / poster session from local academia  
600 - 645pm  
AGM  
700pm

Bob Gill [bgill@ieee.org](mailto:bgill@ieee.org) for more

# **“Humanitarian advancement through technology”**

June 1-4, 2014, Montreal, Canada  
OMNI Hotel, Mont-Royal, Montreal

*Cosponsored by: IEEE Canada, Montreal Section, Ottawa Section, Toronto Section, Vancouver Section, Northern Canada Section, and Newfoundland and Labrador Section*



## **Call for Papers**

The 2014 IEEE International Humanitarian Technology Conference (IHTC) will be held in Montreal, Canada from June 1-4, 2014. The conference will focus on humanitarian applications of technology in the general areas of technologies for improving the lives of underserved peoples (including aboriginal/indigenous peoples), technologies for the disabled, health-related technologies, humanitarian engineering educational programs, and technologies to assist in disaster situations. The conference will feature outstanding keynote speakers, workshops, a student paper competition and peer-reviewed papers. Technology-oriented papers and papers describing social and economic factors related to humanitarian technology implementation are welcome for the conference.

The technical program committee for the 2014 IEEE IHTC invites you to submit a 200-300 word abstract of a paper in any of the following track areas:

1. Mobile Health (mHealth), Medical Technology, and Telemedicine
2. Operations, supply chain and logistics in humanitarian aid and disaster response
3. Water and Agricultural Technologies
4. Off-grid Power, Renewable Energy and Resilient Power Grids
5. Connectivity and Communications Technologies
6. Humanitarian and/or Sustainable Engineering Programs, Educational Technologies, Course Materials, and Curricula
7. Data and Personal Security Technologies for Humanitarian Applications
8. Underwater Wireless Communications for Humanitarian Applications
9. Underwater Robotics for Humanitarian Applications
10. Community Engagement and Social and Economic Factors in Humanitarian Engineering

## **Paper Submission**

The format of the paper should follow the IEEE conference papers style. IHTC 2014 will only accept the electronic submission of a full paper in English with maximum six pages on line by uploading the PDF-format file to <http://www.bytomatters.com/veda/ihtc.aspx>. Detailed information on paper format and submission procedure can be found on the conference website. IHTC 2014 proceedings are included in IEEE Xplore.

Technical Co-Chairs Contacts at Emails:  
[pritpal.singh@villanova.edu](mailto:pritpal.singh@villanova.edu)  
[and.mohamad.sawan@polymtl.ca](mailto:and.mohamad.sawan@polymtl.ca)

## **Important Dates**

Deadline for Abstract Submission ..... January 20, 2014  
Notification of Abstract Acceptance ..... January 31, 2014  
4-page IEEE format Full Paper Due ..... February 28, 2014  
Reviewer's Feedback to Authors ..... March 31, 2014  
Camera-Ready Papers and Copyright Forms Due April 30, 2014

## **Exhibitions**

There will be an exhibition site at the conference. Companies and institutions who are interested are encouraged to contact the exhibition chair for further information.

For more information on IHTC'2014, please contact: Ferial El-Hawary, General Chair c/o Dept of Electrical and Computer Engineering, Dalhousie University Halifax, NS, Canada B3H 4R2  
Tel: +1(902) 494-3911 Fax:+1(902) 422-7535  
E-mail: [F.El-Hawary@ieee.org](mailto:F.El-Hawary@ieee.org)

For detailed up-to-date information, visit the IHTC2014 Conference Web site: [www.ihtc.ieee.ca](http://www.ihtc.ieee.ca)



Halim Yanikomeroglu  
Carleton University

## Emerging concepts and technologies towards 5G wireless networks

Despite the recent advances in wireless technologies, the wireless community faces the challenge of enabling a further traffic increase of up to 1,000 times in the next 10-15 years, while no customer is willing to pay more for the wireless pipe itself: the so called "traffic-revenue decoupling". Moreover, many experts warn that the low-hanging fruits in wireless research (especially in information theory, communications theory, and signal processing) have already been collected. While the research community is full of ideas (as usual), many of these ideas are either not-too-relevant (i.e., not in the bottleneck areas) or they are in areas in which progress toward a tangible implementation is too slow.

- Layer 8 – User-in-the-loop (demand shaping in space and time)
- Millimeter wave communications
- Advanced antenna technologies

In the absence of a clear technology roadmap towards 5G, the talk has, to a certain extent, an exploratory view point to stimulate further thinking and creativity. We are certainly at the dawn of a new era in wireless research and innovation; the next twenty years will be very interesting.

### Distinguished Lecturer

Monday 24 February  
400 pm

Room 418, Macleod Bldg  
2356 Main Mall, UBC

In the first part of this talk, the following topics will be covered:

- Fundamental dynamics of cellular communications
- 3GPP operation
- Key technologies in LTE and LTE-Advanced
- Emerging challenges and opportunities in beyond-2020 wireless networks
- Bottleneck problems in beyond-2020 wireless networks

In the second part of the talk, the potential research directions towards coping with the bottleneck problems, especially in the context of radio access network (RAN), resource allocation, layers 1, 2, and 3, will be discussed; the underlying mathematical tools will also be highlighted:

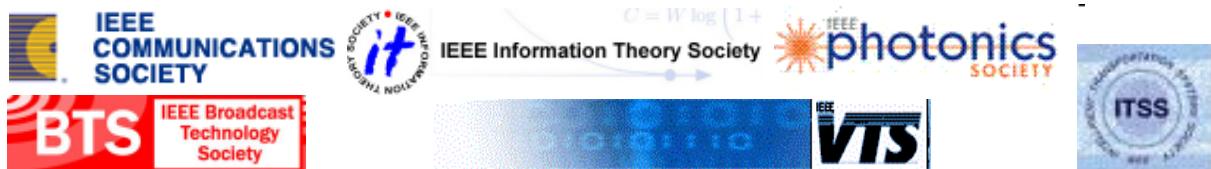
- Thoughts on 5G PHY
- Non-coherent communications
- New frontiers in resource allocation and quality of experience
- Steerable beamforming at the terminal with resource allocation
- Uplink of massive machine-type communications
- Heterogeneous traffic modeling in space and time
- Inter-cell load coordination (ICLC) for non-uniform traffic
- Interdisciplinary approaches in decision making
- Cell switching off in dense small cell deployment
- Robust algorithms and protocols

**Speaker** Halim Yanikomeroglu is a professor at the Department of Systems and Computer Engineering at Carleton University, Ottawa. His research interests cover many aspects of wireless technologies with a special emphasis on cellular networks. Dr. Yanikomeroglu has coauthored about 60 IEEE journal papers; his papers have received more than 5,000 citations. In recent years, Dr. Yanikomeroglu has been involved in several collaborative research projects with the Canadian and international industry; this collaborative research has resulted in 15 patents (applied and granted). Dr. Yanikomeroglu is currently leading the Project 5G funded by the Ontario Ministry of Economic Development & Innovation, Huawei Technologies, and Telus.

Dr. Yanikomeroglu has been involved in the organization of the IEEE Wireless Communications and Networking Conference (WCNC) since its inception in 1999 in various capacities, including serving as the Steering Committee member, and the Technical Program Chair or Co-Chair in 2004, 2008, and 2014. He was the General Co-Chair of the IEEE Vehicular Technology Conference Fall 2010. Dr. Yanikomeroglu has served in the editor boards of IEEE Transactions on Communications, IEEE Transactions on Wireless Communications, and IEEE Communications Surveys and Tutorials. He is a former chair of the IEEE's Technical Committee on Personal Communications (now called, Wireless Technical Committee). Dr. Yanikomeroglu is a recipient of several teaching and research excellence awards. He is a Distinguished Lecturer for the IEEE Vehicular Technology Society.

<http://www.sce.carleton.ca/faculty/yanikomeroglu.html>

**Information**  
Joint Communications  
Chair Vincent Wong  
vincentw@ece.ubc.ca



Jt. Chapter BT-02/COM-19/IT-12/ITS-38/PHO-36/VT-06



S. Cherukupalli  
BC Hydro

## An overview of BC Hydro's Vancouver city central transmission – 230kV XLPE cable project

This is BC Hydro first 230kV XLPE cable system and the presentation will provide an overview of the project, some of the unique challenges faced during its execution, the installation methods, and some of the novel ac hi voltage partial discharge methods adopted to commission these cable systems. The ability to monitor the real-time cable temperatures using Distributed Temperature Measurement technology and how this information can be used by the Sys Ops to optimally operate the Asset will be presented.

He has more than 30 years of experience in the industry in the areas of high voltage testing of power equipment, 420kV switchgear design, developing novel diagnostics tools for the condition assessment of power equipment, transmission cable design, and the application of electro-optical devices for power system applications. He has been a principal investigator on several projects sponsored by the Electric Power Research Institute, Canadian Electricity Association, as well as BC Hydro Strategic R&T. He has also undertaken several projects on hydro generator insulation system assessment for utilities such as Grant County Public Utility District (PUD), the California Department of Water Resources (CDWR), Potomac Electric Power Company (PEPCO) and manufacturers.

**Speaker** Dr. Sudhakar Cherukupalli obtained his Master in High Voltage Engineering from the Indian Institute of Science in 1976 and his Ph.D. from the University of British Columbia in 1987. Dr. Sudhakar Cherukupalli is a member of the IEEE – Insulators Conductors Committee , currently serve as IEEE-DEIS Standards Liaison and is a WG member of several IEEE Standards on “Partial Discharge Monitoring Systems for Transmission Cables”, “Real-time Ratings for Transmission Cable Circuits”, “Thermal cycling of Large Hydro Generators”. He served as Vice Chair – Electrical materials Sub Committee (Rotating Machines) and Past-Chair of the IEE-ICC Education Committee. He has served as an Adjunct Professor at the University of British Columbia. He just completed his term as a Canadian National Representative on CIGRE-D1 (Emerging Technologies and Test Techniques).

He jointly holds a European and US Patent that was awarded for method and apparatus for measuring voltage using electric field sensors. He has published over 35 technical papers in International Conferences and Journals and published several technical research reports for the Canadian Electricity Association, Electric Power Research Institute. Currently he is a Principal Engineer, Team Lead for Transmission Cables Design in T&D Engineering at BC Hydro. He is a Senior Member of the IEEE and registered member of Association of Professional Engineers and Geoscientists of British Columbia (BC), Canada.

Monday 24 February

Noon to 1:00 PM

BC Hydro - Edmonds A01  
Skytrain Auditorium  
6911 Southpoint Drive,  
Burnaby

### Information

Joint Power & Energy Chair  
Rama Vinnakota  
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ED:06FEB14



### British Columbia Privacy and Security Awareness Day

06 February 2014 has been designated as BC Privacy and Security Awareness Day.

A “call to arms” to draw focus to, and inform citizens throughout the province of, the inherent risks associated with cyberspace, and the simple, practical advice on how to minimize their exposure to these risks.

IEEE Vancouver supports the campaign to promote awareness of privacy and security. \*ISACA Vancouver, which promotes privacy and security awareness in

BC,.is leading this initiative. BC Privacy & Security Awareness Day is unique in that it is community-based and aimed at the general public. Today, with the proliferation of personal mobile devices and notebooks constantly moving between home and corporate networks, we are all connected, and our collective IT savvy is essential to ensuring our privacy and security. For more information please visit: [www.bcaware.ca](http://www.bcaware.ca)

\*ISACA is an international professional association focused on IT Governance. It is an affiliate member of the International Federation of Accountants (IFAC). Previously known as the Information Systems Audit and Control Association, ISACA now goes by its acronym only, to reflect the broad range of IT governance professionals it serves.