

IEEE Communications Society

Distinguished Lecture Tour

Stephen F Bush

(<http://www.research.ge.com/~bushsf>)

Ontario and Quebec, Canada

April 11-15, 2011

It was truly an honor to serve as a Distinguished Lecturer and a joy to share information on the smart grid and communications with the IEEE chapters of our friends to the North in Ontario and Quebec, Canada. I would like to thank Yigang Cai and Carole Swaim for their tireless efforts in coordinating the tour. Of course, I feel indebted to my hosts throughout Ontario and Quebec who provided outstanding hospitality. I would like to recognize the locations and official hosts in Table 1.

Table 1: Tour Schedule.

| Date | Location | Host |
|---|--|---------------------------------|
| April 11 (Mon): Meeting at Kingston chapter | Queen's University | Francois Chan / Shahram Yousefi |
| April 12 (Tue): Meeting at Ottawa chapter | Algonquin College | Wahab Almuhtadi |
| April 13 (Wed): Meeting at St-Maurice chapter | University of Quebec at Trois-Rivieres | Adel Omar Dahmane |
| April 14 (Thu): Meeting at Montreal chapter | Concordia University | Anader Benyamin |

I did not keep careful count of attendees, but there was clearly a tremendous interest in the smart grid exhibited by the number of attendees, their intense interest in the lecture, and their questions. With the exception of the first lecture, the auditoriums were generally filled to capacity and, in the case of the lecture at Concordia in Montreal; the lecture hall was filled well beyond capacity. The lectures were oriented to last from 1 to 1.5 hours, depending upon the background and interests of the audience; however, lecture times often exceeded those time limits with questions from the audience.

There were many questions. Some of the more frequently asked and interesting questions were (1) What role will sensor networks play in the smart grid and what are the unique challenges? (2) Do hierarchical communication architectures make sense? (3) Will power line carrier and Goubau (wave guide) lines play a significant role in the smart grid? (4) Where is the precise boundary between the "traditional" power grid and the "smart grid," that is, when should someone really call their work part of the "smart grid?" (5) Is demand-response and electric vehicle impact research receiving too much

attention at the expense of other operational aspects? (6) What new algorithms should be explored for highly decentralized control of the power grid? (7) What more can power systems and communications learn from each other (8) Concern was expressed regarding cybersecurity, particularly for wireless communication. I think a question that was always asked after each lecture was (9) where is the smart grid headed, in a long-term, general sense? Finally, one of the most strongly voiced opinions that I heard was (10) we need more people who can combine a both a strong fundamental power systems understanding with a strong fundamental understanding of communications.

Figure 1 shows a sample flyer announcing the talk followed by the abstract and biography. I hope the audiences found the lecture not only an informative summary on the current and near-term aspects of the power grid, but also a thought-provoking discussion of new concepts and ideas for the longer-term such as the role of nanotechnology (Bush, S. F. (2010). *Nanoscale Communication Networks* (p. 308). Artech House Incorporated. Retrieved December 14, 2010, from [http://ge.geglobalresearch.com/blog/nanoscale-communication-networks/.](http://ge.geglobalresearch.com/blog/nanoscale-communication-networks/)) and active networks (Bush, S. F., & Kulkarni, A. B. (2001). Active networks and active network management: a proactive management framework (p. 212). Springer US. Retrieved December 14, 2010, from <http://www.amazon.com/Active-Networks-Network-Management-Proactive/dp/0306465604.>) all of which I will cover in Bush, S. F. (2012). *Smart Grid: Communication-Enabled Intelligence for the Electric Power Grid*. John Wiley & Sons, Ltd.

I would like to mention again that it was a wonderful lecture tour and I met many great people.



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ICE

The IEEE Montreal Section and the Joint Chapter of Communications Society and the Chapter of Power Engineering (ComSoc/PES), and Concordia University are inviting all interested IEEE Montreal members and other engineers, technologists, and students to a technical seminar on:

“Communications for the Smart Grid”

By

Dr. Stephen F Bush
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Researcher at General Electric Global Research,
Niskayuna, NY. USA

DATE: **Thursday April 14th, 2011.**
TIME: Refreshments, Registration and Networking: **6:00 PM**; Seminar: **6:30 PM – 8:00 PM.**
PLACE: Concordia University, Electrical & Computer Engineering Department, **Room EV002.260**
ADMISSION: Free. Registration required. To ensure a seat, please register by e-mail contacting:
Dr. Anader Benyamin-Seeyar at anader.benyamin@ieee.org.
More Info: <http://ewh.ieee.org/r7/montreal>.

Figure 1: Sample Flyer Announcing the Lecture.

Abstract

Electric power grids around the world are rapidly evolving to make more extensive use of communication technology. New intelligent electronic devices are being developed and deployed in which communications is becoming a ubiquitous and natural part of power systems allowing new forms of collaborative behavior. An analogy is often made between the interconnection of personal computers many decades ago resulting in the rise of the Internet and what is happening within the power grid today. However, the power grid is a large and complex machine with many aspects; it comprises a very broad set of topics. This hour-long talk will begin with a review of power systems and focus upon emerging communications capabilities within the power grid including: metering and demand-response, distributed generation, fault detection isolation and restoration, and a brief overview of emerging standards. We will end with a discussion of more speculative innovations that may impact the smart grid further into the future.

Dr. Stephen F Bush's brief Bio

Stephen F Bush received the B.S. degree in electrical and computer engineering from Carnegie Mellon University, Pittsburgh, PA, and the M.S. degree in computer science from Cleveland State University, Cleveland, OH, and the Ph.D. degree from the University of Kansas, Lawrence. He is currently a Researcher at General Electric Global Research, Niskayuna, NY. Before joining GE Global Research, he was a Researcher at the Information and Telecommunications Technologies Center (ITTC), University of Kansas. He has been the Principal Investigator for many DARPA and Lockheed Martin sponsored research projects including: Active Networking (DARPA/ITO), Information Assurance and Survivability Engineering Tools (DARPA/ISO), Fault Tolerant Networking (DARPA/ATO), and most recently, Connectionless Networks (DARPA/ATO), an energy aware sensor network project. He is the author of Nanoscale Communication Networks (Norwood, MA: Artech House, 2010). He coauthored a book on active network management, titled Active Networks and Active Network Management: A Proactive Management Framework (New York, NY: Kluwer Academic/Plenum Publishers, 2001). He has taught Quantum Computation and Communication at RPI and Computer Communications at the State University of New York at Albany. Dr. Bush is the past chair of the IEEE Emerging Technical Subcommittee on Nanoscale, Molecular, and Quantum Networking. He is also on the steering committee for the IEEE Smart Grid Vision Project.