

## **C4P: Communication Networks for Power Engineers**

October 17, 2011 (2pm - 5pm)

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The goal of the C4P tutorial is to explain how communication networks work and how they can be designed and employed in the Smart Grid setting.

### **Background and content**

The Smart Grid relies critically on communication and interaction among several devices to achieve its goals. In this framework, to enable incremental development of Smart Grid concepts, it is required to exploit the currently available communication technologies, including fiber-optics, and powerline communications, wireless metropolitan and local area networks, wireless sensor networks. Nevertheless, current communication technologies are not designed to completely fulfill the strict requirements of the future smart grid, therefore requiring the development of novel architectures and networking paradigms, aimed at real-time control, information and data exchange to optimize system reliability, agility, asset utilization, and security.

### **The following topics are covered in the tutorial:**

- The smart grid: a communications perspective and vision for the future
- A taxonomy of the state-of-the-art in communications for the smart grid:
  - Wired communications: fiber-optics, powerline
  - Wireless communications: WiMAX, WiFi, UWB, ZigBee, 3/4G, WSN
- Open issues and potential solutions:
  - Network design for smart grid communications
  - Communications infrastructure for electric vehicles
  - Network reliability for smart metering and renewable sources
  - Smart grid control and pricing for distribution and micro grids
  - Security issues, communication protocols and standards
  - Examples (or call it “case study”? depends on what Wenye can do)

### **Who should attend**

Especially power engineers who work in the Smart Grid context, and required to understand the current status of communication technology and how it fits the challenges and needs of the emerging Smart Grid.

## Biographies



**Fabrizio Granelli** received the «Laurea» (M.Sc.) degree in Electronic Engineering from the University of Genoa, Italy, in 1997, with a thesis on video coding, awarded with the TELECOM Italy prize, and the Ph.D. in Telecommunications from the same university, in 2001. Since 2000 he is carrying on his research and didactical activities (currently Associate Professor in Telecommunications) at the Dept. of Information Engineering and Computer Science – University of Trento (Italy). In August 2004 and August 2010, he was visiting professor at the State University of Campinas (Brasil). He is author or co-author of more than 100 papers in the field of communications and networking published in international journals, books and conferences, and he is member of the Technical Committee of the International Conference on Communications (from 2003 to 2007) and Global Telecommunications Conference (GLOBECOM2003 and GLOBECOM2004). Dr. Granelli is guest-editor of ACM Journal on Mobile Networks and Applications, special issues on “WLAN Optimization at the MAC and Network Levels” and “Ultra-Wide Band for Sensor Networks”, and Co-Chair of 10th IEEE Workshop on Computer-Aided Modeling, Analysis, and Design of Communication Links and Networks (CAMAD’04). Dr. Granelli is General Vice-Chair of the First International Conference on Wireless Internet (WICON’05) and General Chair of the 11th and 15th IEEE Workshop on Computer-Aided Modeling, Analysis, and Design of Communication Links and Networks (CAMAD’06 and CAMAD’10). He is Co-Chair of GLOBECOM 2007-2009 Symposia on “Communications QoS, Reliability and Performance Modeling”.

He is Senior Member of IEEE, former Chair of IEEE ComSoc Technical Committee on Communication Systems Integration and Modeling (CSIM) and Associate Editor of IEEE Communications Letters, IEEE Communications Surveys and Tutorials, International Journal on Communication Systems, Journal of Wireless Communications and Networking.



**Michael Devetsikiotis** received the Diploma degree in Electrical Engineering from the Aristotle University of Thessaloniki, Greece, in 1988, and the M.Sc. and Ph.D. degrees in Electrical Engineering from North Carolina State University,

Raleigh, in 1990 and 1993, respectively. In October 1993 he joined the Broadband Networks Laboratory at Carleton University, Ottawa, Canada, as a Research Associate. He became an Adjunct Professor in the Systems and Computer Engineering Department, Carleton University, in 1995, an Assistant Professor in 1996 and an Associate Professor in 1998. Since November 2000 he has been with the Department of Electrical and Computer Engineering, North Carolina State University, Raleigh, where he has been a Professor since 2006. His research work has been in the areas of telecommunication systems modeling, performance evaluation, and efficient simulation; traffic characterization and management; and optimization techniques applied to the analysis and design of communication systems. His recent focus has been on the modeling of information networks related to social media and smart grid communications.

Michael served as Chairman of the IEEE Communications Society Technical Committee on Communication Systems Integration and Modeling and is now a member of the Communications Society Education Board. He has served as an Associate Editor of the IEEE Communications Letters, and is currently an Area Editor of the ACM Transactions on Modeling and Computer Simulation and a member of the editorial boards of the International Journal of Simulation and Process Modeling, the IEEE Communications Surveys and Tutorials, and the Journal of Internet Engineering. He co-chaired the Next Generation Internet symposium under IEEE ICC 2002 in New York, the High-Speed Networks symposium under IEEE ICC 2004 in Paris, the Quality, Reliability and Performance Modeling (QRPM) symposium under IEEE ICC 2006 in Istanbul, and the Quality, Reliability and Performance for Emerging Network Services symposium under IEEE Globecom 2006 in San Francisco. He served as Workshops Chair for IEEE Globecom 2008 in New Orleans, and co-chair of the workshops on “Enabling the Future Service Oriented Internet” (2007, 2008 and 2009). Michael recently co-chaired the QRPM Symposium under IEEE Globecom 2010, in Miami, and IEEE CAMAD, in Kyoto, Japan. He will co-chair the QRPM symposium at IEEE ICC 2012 in Ottawa, Canada.



**George Michailidis** received his Ph.D. in Mathematics from UCLA in 1996. He was a post-doctoral fellow in the Department of Operations Research at Stanford University from 1996 to 1998. He joined The University of Michigan in 1998, where he is currently a Professor of Statistics, Electrical Engineering & Computer Science. His research interests are in the areas of stochastic network modeling and performance evaluation, queuing analysis and congestion control and statistical modeling and analysis of Internet traffic. George Michailidis is member of the IEEE ComSoc Committee on Smart Grid Communications.

