

Tutorial: Understanding Software Defined Radio: A Wannabe Eavesdropper's Perspective

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Biographical Data

Dr. Michel Barbeau is a full Professor and the Associate Director, School of Computer Science, Carleton University. He has got his B.Sc. Computer Science from Universite de Sherbrooke (1985), M.Sc. Computer Science from Universite de Montreal (1987) and Ph.D. Computer Science from Universite de Montreal (1991). He had been a Professor at Universite de Sherbrooke (1991-1999) and a visiting researcher at Aizu University, Japan (1998-1999) and Alcatel Canada (2004-2005). He can be described best as a software expert with specific expertise in telecommunications protocols (link, network, transport), mobile and wireless networks, satellite telecommunications, object-oriented design and programming, distributed objects and operating systems. His academic honours include: Research Achievement Award, Carleton University, 2005; Governor Generals Academic Gold Medal, Universite de Montreal, 1991. He has published about 40 research papers in referred journals and conferences, and he is the owner of two patents.

Tutorial Description

Learn and become familiar with a combine hardware and software technology with which you can virtually intercept and decode any wireless signal. In this tutorial you learn hardware platforms for Software Defined Radio (SDR). The difference with software-controlled radio is clarified. The software architecture of SDR is explained. The tutorial puts an emphasis on the basic concepts of digital signal processing required for an understanding of SDR, with several signal-decoding examples.

The length of the tutorial is 3 hours. The tutorial will especially target graduate students in computer science, engineering and mathematics.

This is a beginner's tutorial with a lot of hands-on exercises done by the participants to put in practice the presented concepts. The Octave software is used as a teaching aid.

Prerequisites:

- A laptop with the Octave software installed (most of the systems are supported; free download from: <http://www.gnu.org/software/octave>)
- Knowledge of the concepts of frequency, period and bandwidth
- High school trigonometry
- Knowledge of a programming language

Topics covered:

- SDR architecture
- Analog to digital conversion
- Digital to analog conversion
- I and Q signals
- Digital signal processing
- Amplitude, frequency and phase (de)modulation
- Digital filters
- Spectrum analysis
- Open source SDR projects