University of Pavia

Ph.D. School of Electrical and Electronics Engineering and Computer Science

SEMINAR

An overview on Software Defined Radio and Cognitive Radio

Alessandro Trogolo
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aula seminari (ex Dip. Elettronica) - D floor
h 14:00 – 16:00

Since the first half of the 80's, we assisted to an exponential growth of the wireless systems and the mobile services that led to the definition of several standards. In this framework, in the last years, the concepts of Software Defined Radio (SDR) and Cognitive Radio (CR) have been proposed as a potential pragmatic solution, first in the context of the research and more recently in the standardization one: a software implementation of the device able to dynamically adapt its operations to the environment in which is acting.

In particular, the term Software Defined Radio stands for "radio functionalities defined by software", meaning the possibility to define via software the typical functionalities of a radio interface that usually are implemented in the transmitters and receivers with a dedicated hardware. The presence of a software component in the radio interface implies necessarily the employment of programmable hardware (e.g. Digital Signal Processors). In this way, it is possible to replace the dedicated hardware for the real time execution of the software related to the considered radio interface. The Cognitive Radio technology has the additional capability to make the devices able to adapt itself to the radio environment in an intelligent way. Coupled with the concept of SDR that provides more flexibility and reconfiguration capabilities, a Cognitive Radio device is then expected to be able to react to the variations of the radio conditions as well as to the traffic ones. CR technology as such, will typically find application in heterogeneous multi-radio networksIn fact, it is fundamental to consider traffic variations of different radio systems of the network, even in scenarios that foresee more flexible methodologies in the spectrum management.

This seminar aims to offer a panoramic view on this interesting and challenging landscape. In particular, the definitions of the SDR and CR concepts, an overview of the main related research activities in Europe, the most recent standardization activities in ITU and in ETSI, as well as the possible medium/long term solutions for a mobile operator currently under study, will be treated.

Alessandro Trogolo received his M. Sc degree in Telecommunication Engineering in 2001 from Politecnico di Torino, Turin, Italy. In the same year he joined Telecom Italia S.p.A. working on radio access aspects of GSM, (E)GPRS and UMTS systems. His current topic is dealing with radio resource management and network performance analysis for LTE system. In 2003 he joined the research group in Telecom Italia working on next generation systems based on Software Defined Radio, Cognitive Radio technologies and Dynamic Spectrum Management. He participated in E2R, E2R II, E3 european projects and he has been vice-chairman of WG6 "Cognitive Wireless Networks and Systems" of the Wireless World Research Forum (WWRF) from 2008 to 2012. Regarding his work on standardization, he is delegate for Telecom Italia in the ETSI TC RRS (Reconfigurable Radio Systems) group and, since November 2010, also in the ITU-R WP5A group following the activities on SDR and CR

Organizer	**Ph.D. Coordinator**
Prof. Lorenzo Favalli	Prof. M. Calzarossa

The seminar will take place in Italian
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