

Title: E²R II Tutorial
Speaker: Dr. Didier Bourse
Duration: Half Day (3 hours)
Affiliation: Motorola Labs

Name of the other speaker(s): Markus Muck (1), Nancy Alonistioti (2), Klaus Moessner (3), Eric Nicollet (4), Enrico Buracchini (5), Panagiotis Demestichas (6).
One additional Speaker (Guest Key Note) may join the Tutorial.

Affiliation of the other speaker(s): (1) Motorola Labs, (2) University of Athens, (3) University of Surrey, (4) Thales Communications, (5) Telecom Italia Lab, (6) University of Piraeus.

Rationale: the overall objective of the tutorial:

This tutorial provides an overview of research activities on end-to-end reconfigurability that aims at bringing the full benefits of the valuable diversity within the radio eco-space, composed of a wide range of systems such as cellular, wireless local area and broadcast. The objective of end-to-end reconfigurability is to devise, develop and trial architectural design of adaptive communication systems to offer an expanded set of operational choices to the users, applications and service providers, operators, manufacturers and regulators in the context of heterogeneous mobile radio systems.

The tutorial presents the major concepts and solutions developed by the E²R Programme:

- Unified Business Model (UBM),
- Responsibility Chain Concept,
- R&TTE Directive Extension for Reconfigurable Equipment,
- End-to-End Reconfigurability System Architecture (SA),
- Reconfiguration Management Plane (RMP),
- Network Support Architecture for Reconfiguration,
- Functional Architecture (FA) for Resource Efficiency,
- Advanced Radio Resource Management (ARRM),
- Flexible Spectrum Management (FSM),
- Dynamic Network Planning and Management (DNPM),
- Cognitive Pilot Channel (CPC),
- Equipment Management and Control (EMC) Architecture,
- Functional Description Language (FDL) for Physical Layer Processing.

Several key challenges are identified for End-to-End Reconfigurability such as transforming embedded flexibility into end-to-end reconfigurability, capturing the newly enabled functionalities into sizeable benefits and finding right balance between integrated versus distributed approaches. This tutorial will give to the participants a detailed overview of the end-to-end reconfigurability research work, depicting the origins, visions, enabling technologies, and system aspects.

Outline: a brief structure of the tutorial:

1. From Software Defined Radio to End-to-End Efficiency
 - 1.1) Research and Developments on SDR, CR and Reconfigurable Radio and Networks
 - 1.2) EU FP6 E²R Programme in a Nutshell
 - 1.3) E²R Programme Key Technical Achievements
2. Business Models and Standardization/Regulation Perspectives for Cognitive Radio Systems
 - 2.1) Unified Business Model (UBM)
 - 2.2) Key UBM Instantiations (DSA, CPC, White Plastic...)
 - 2.3) Technology Roadmaps towards Cognitive Networks and Reconfigurable Equipment
 - 2.4) Regulatory and Standardization Perspectives

3. System Architecture and Reconfiguration Management Plane
 - 3.1) System Architecture (SA)
 - 3.2) Reconfiguration Management Plane (RMP)
 - 3.3) Architectural Perspectives for Cognitive Radio Systems

4. Efficiency Enhancement for Radio Resource and Spectrum
 - 4.1) Managing Spectrum and Radio Resources in a Reconfigurability and Cognitive Network Context
 - 4.2) Functional Architecture for Managing Radio Resources and Spectrum in a Reconfigurability Context
 - 4.3) Solution Algorithms for the Control Domain and Machine Learning Functionality
 - 4.4) Key Results

5. Cognitive Equipment Management and Control
 - 5.1) Cognitive Radio and Base Stations Architecture
 - 5.2) Managing and Controlling Equipment Configuration and Reconfiguration
 - 5.3) Lessons learnt from Prototyping

6. Key Challenges to enable the Seamless Experience
 - 6.1) Key Lessons learnt from FP6 E²R Programme
 - 6.2) Cognitive Radio Systems Time Frames
 - 6.3) Next Research Challenges

Intended audience:

Managers, engineers, scientists, and graduate students who want to understand what are the challenges to be fulfilled for achieving end-to-end reconfigurability, what are the enabling technologies that are available, and which are the system aspects that are being investigated.