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Funding decision

Name	Organisation	Project title	Decision No.	Decision date	Funding period	Funding
Latva-Aho, Matti	OY	WIRELESS NETWORKS WITH MULTI-LAYER STATISTICAL INFERENCE	128010	15.09.2008	01.01.2009 - 31.12.2011	405 000

Project description
With the rapid development of mobile Internet services, the forthcoming wireless systems are expected to provide high rate multimedia services. A fundamental problem in designing such a system is how to efficiently allocate the limited frequency resources among the users of the network. While the use of advanced signal processing techniques may enable a very efficient usage of the spectrum even in the traditional framework of command and control spectrum management, there is a worldwide recognition that these methods of spectrum management have reached their limit. In fact spectrum utilization studies carried out at different locations have shown that most of the assigned (licensed) spectrum is under-utilized. Considerable spectrum is available when both the dimensions of space and time are considered and hence the problem of spectrum scarcity as perceived today, is in most cases one of inefficient spectrum management rather than spectrum shortage. This observation has prompted researchers to investigate radically different more flexible access paradigms. The envisioned schemes contemplate for example the cases where secondary (unlicensed) systems are allowed to opportunistically utilize the unused primary (licensed) bands, commonly referred to as the white spaces, or in a more long term phase the scenario of a liberalized spectrum usage where the achievement of small enough interference levels to allow inter-system coexistence would be assured by the technology rather than by fixed spectrum assignment or regulations. The development of frequency agile terminals that can sense holes or white spaces in the spectrum and adapt their transmission characteristics to use these "holes" may provide one tool to address and take advantage of this spectrum under-utilization. Although, some current adaptive radio systems already exhibit the feature of automatically adjusting their parameters for a given standard, the development of truly agile terminals requires to go much further, since it is not possible for the designers to foresee all the possible environment scenarios and then provide deterministic schemes for selection and reconfiguration. This requires incorporation of learning features in the terminal that can sense the radio environment and learn to adapt to it, defining what is usually called as cognitive radio (CR). The scope of the project covers selected fundamental issues enabling utilization of opportunistic communication systems. Namely, the project investigates 1) fundamental methods related spectrum opportunity estimation, 2) radio resource management schemes suitable for opportunistic systems and 3) theoretical models for broadband heterogeneous wireless systems traffic and channel modeling suitable for system level performance assessment. Besides contribution to European projects and possibly other national projects, this project shall output a number of international conference and journal publications as well as two PhD theses.