

Dear Reader,

This fifth edition of the ACROPOLIS Newsletter places a significant emphasis on general summation of the first year of the Project. Thus, as an introduction, we provide you with some highlights from the first year as well as an elaboration on some of the achievements thus far. This is followed by reflections on the First Annual ACROPOLIS Workshop held in October, and a summary of the latest activities within the project's research clusters. Next, we familiarise you with the program of the upcoming ACROPOLIS Winter School 2012, which will be hosted by EURECOM in February in France. Furthermore, we are pleased to announce that the first interview with an expert has been conducted, and relevant text is available in the Industry Section of this newsletter. This text is preceded by reflections on the ACROPOLIS Industry Panel, held in conjunction with the ACROPOLIS workshop.

As usual, a quite significant part of this newsletter is devoted to standardisation and regulation as well as other research projects of relevance to coexistence technologies such as cognitive radio.

Towards the end of the newsletter, we give you an up-to-date summary of various noteworthy events and calls-for-papers, such that you will not miss important conferences and publication opportunities in the field of coexistence technologies.

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We hope you enjoy reading this issue of our Newsletter!

The ACROPOLIS editing team

Having completed the first year of the ACROPOLIS project, we can look back on a number of successes. A large number of research collaborations have been initiated within the project, which have resulted in numerous interesting outcomes and the beginnings of papers appearing in prestigious conferences and journals. Various events and journal special issues have been organised, and a number of lectures, tutorials and courses have been given.

Reflections from The First Annual ACROPOLIS Workshop and Industry Panel

The First Annual ACROPOLIS Workshop has shown some of the early fruits of the joint work within the project. This workshop included 17 topical presentations, illustrating the depth of collaboration within ACROPOLIS and an initial taste of what can be achieved by combining the particular strengths of the ACROPOLIS partners. The Industry Panel which followed the workshop included some extremely interesting observations and discussions on implementation aspects and opportunities for TV Whitespace from an operator's point of view, as well analysis of more general challenges and issues involved in TV Whitespace, among many other topics.

The first Interview with an Expert

As the first instalment of our "Interview with an Expert" series we provide detail on an interesting conversation with Dr Przemyslaw Pawelczak. You can find this in the "Industry Section" of this newsletter.

News from related EU Projects

Traditionally, we provide you with the latest information from relevant European research projects. The "Other CR-related News" section details work in OneFIT, QUASAR, COGEU and others.

ACROPOLIS in its First Year

The first year of ACROPOLIS has been a success from a number of perspectives. Numerous collaborative research efforts have been initiated, and the fruits of those efforts are now beginning to be seen. Moreover, a number of successful workshops and special sessions have been organised, showing the strengths of the project and its work and further promoting the success of coexistence technologies in the wider community. One example is the workshop at IEEE PIMRC, held in Toronto in September 2011. This showcased a real strength and breadth in the papers that were presented, and incorporated an extremely involved panel discussion.

Significant initial impact has been achieved within standardisation, particularly with IEEE DySPAN-SC through contributions and input in leadership positions, as well as within ETSI-RRS. Moreover, initial interactions with regulators have been realised. These are being accelerated at this moment.

Educational activities in coexistence technologies have been undertaken, and have shown real value in terms of driving the industry forward by creating the next generation of experts in this pioneering area. The ACROPOLIS Summer School 2011, in collaboration with the COST IC0902 Summer School, attracted over 100 participants at the levels of postgraduate and PhD students, established researchers, and Lecturers and Professors of esteemed institutions. Other activities such as the creation of PhD courses have given well-rounded and comprehensive knowledge foundations on areas of relevance to coexistence technologies. A number of tutorials given by ACROPOLIS members, for example at IEEE DySPAN 2011, have also been highly successful and well attended.

ACROPOLIS in a Nutshell

The purpose of ACROPOLIS is to link experts and projects from around Europe working on coexistence technologies such as spectrum sharing and cognitive radio, to obtain a rounded complement of European research and to investigate areas that are missing from the current European research repertoire. Such coexistence technologies within ACROPOLIS are aimed towards the optimisation of radio spectrum usage.

News from ACROPOLIS

ACROPOLIS has arranged a meeting with the UK's regulator, Ofcom. This will occur in February, and promises to discuss a number of interesting new ideas in DSA, CR and other areas, aiming at enhancing spectrum regulation and facilitating spectrum coexistence related technologies.

ACROPOLIS has featured prominently in the concept of a "Dedicated Cognitive Radio Band", presented to a range of influential people, included the FCC, the US DoD, the NTIA and numerous others, at the Wireless Innovation Forum meeting in November. This is a concept that has been envisioned in ACROPOLIS work such as Deliverables D9.1 and D10.1, and has been the subject of comment and discussion within ACROPOLIS in its first year.

ACROPOLIS has held a successful first year audit, and aims to strengthen the good work that has been carried out in its first year. A number of very positive comments on the project have been made by auditors.

In the following content, the latest activities within ACROPOLIS are briefly described in order to give insight into the project's progress and directions.



Cluster 1 update

In the end of September ACROPOLIS Partners cooperating within WP7 released Deliverable 7.1 – a public document which comprises fundamental challenges in SDR design from hardware (front-end) and software point of view, the latest developments and trends, the platforms and test-beds experienced and deployed by ACROPOLIS partners (GNU, IRIS, USRP1/2/n210, WARP, OpenAirInterface, ORBIT, CREW, and others) including experimental examples. It also includes evaluation and roadmap of SDR/CR platforms, including evaluation of key platforms and roadmaps of the platforms used by various ACROPOLIS partners, here, shortcomings and positive experiences are collected. The document concludes with the recommendations for other research groups that should help them on the selection of suitable platforms.

At the same time, ACROPOLIS Partners from WP8 finalised Deliverable 8.1 entitled “Context Representation for Cognitive Radios and Networks”. This report analyses the context based on which cognitive radios and networks make decisions. Features that define the context are identified and their representation and relevance for the decision-making process are discussed. Elaboration focuses on features that can be utilized for spectrum sensing, network and neighbourhood detection, or for building interference maps. Furthermore, features and context components that are specific for the three spectrum sharing paradigms, underlay, overlay, and interweave spectrum sharing were discussed too.

Furthermore, the PhD courses related to the topics addressed in Cluster 1 have also been finalized. The following modules have been prepared:

- An Information Theoretic Introduction to Cognitive Radio
- Cognitive Management Systems for enabling Future Internet Architectures and Scenarios
- Opportunistic networks for enabling Future Internet Applications and Scenarios
- Practical implementation of different spectrum sensing techniques
- Spectrum Sensing and Management in Cognitive Radio Networks
- Introduction to Flexible Radio Concepts
- Fundamentals of Software Defined Radio and Cognitive Radio

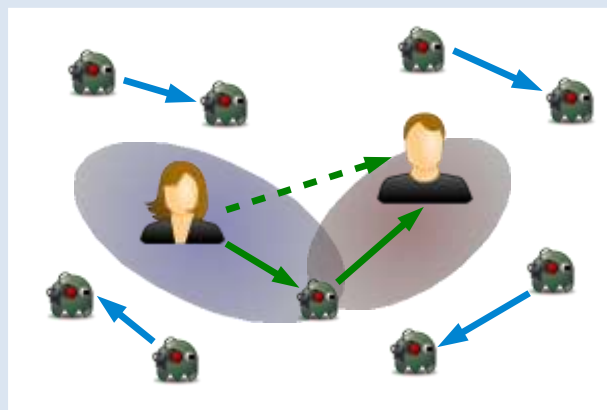
Notable and new Collaborations

- EURECOM-RWTH (cross WP cooperation between WP5 and WP7): on design of an Application Specific Instruction Set Processor (ASIP) for digital Front-End Processing for the OpenAirInterface Platform. The first results of this work have been reported in the 1st annual ACROPOLIS workshop held on 4th of October in Barcelona.
- The work done towards D7.1 reviewing experimental platforms low-end spectrum sensing (such as USRP2, SunSPOT and TI eZ430) has lead to a new cooperation between UKIM and PUT on studying signal sensing algorithms on such low-cost platforms. The first initial results from this new collaboration referred to implementation issues on USRP platform and were reported in the 1st annual ACROPOLIS workshop.
- PUT and CTTC are preparing joint paper for European Wireless Conference 2012.
- In a framework of new collaboration, KTH, IASA, and UoS address the problem formulation with the interconnection of networks and the investigation of spectral and energy efficiency. In particular, the work has been focusing on systems where primary and secondary networks coexist and share the same frequency band.
- Collaboration between KTH, TUD, PUT resulted in two papers presented at the 1st annual Acropolis Workshop. The work in this cooperation has mainly considered the cognitive radio channel with single-antenna primary nodes and a MISO secondary link. For this setup the performance in terms achievable secondary rates for two different coding

strategies at the secondary transmitters has been evaluated. Results of this work have been submitted to the IEEE WCNC 2012 and to the International ITG Workshop on Smart Antennas 2012. Additional results providing achievable rates for coexisting secondary users in presence of a primary user using the so-called crystallized rate regions have been submitted as well to the International ITG Workshop on Smart Antennas 2012.

- A winter school on platforms has been prepared by EURECOM and RWTH to be held in February 2012 (this is a joint activity between WP5 and WP7): an excellent opportunity to get hands on experience with both the OpenAirInterface.org and WARP radio platforms since a significant amount of time is dedicated to lab sessions using these platforms. For more details please visit the “Educational Activities” section.

Joint KTH and TUD Tutorial on Cognitive Radio and Physical Layer Security was presented at the IEEE SwE-CTW 2011, Stockholm by E. Jorswieck and R. Thobaben.



The rapidly increasing demand for radio spectrum, which is required for deploying new wireless services, as well as limitations on available unoccupied spectrum have been the motivation for a large body of research on cognitive radio during the last decade. Here, the general goal has been to increase the efficiency of spectrum utilization by allowing wireless systems with cognitive features to coexist in the same frequency band. Even though the developed coexistence and spectrum sharing techniques will undoubtedly improve the efficiency of spectrum utilization, we may encounter an inherent loss in privacy due to the broadcast nature of the wireless medium. Here, a standard assumption in the related literature is that privacy can be achieved through encryption; however, this requires reliable secret key distribution. In situations where secret key distribution is difficult to realize, concepts from physical-layer security or information theoretical security offer alternative transmission concepts to ensure secrecy in wireless networks.

Motivated by the observation that coexistence and spectrum sharing may induce loss of secrecy, authors discussed spectrum-sharing concepts from the cognitive radio literature as well as concepts from physical layer security in this tutorial. They explained fundamental transmission strategies and showed how they can be implemented by channel coding. The overall goal of this tutorial was to show similarities between the concepts of those two areas and to identify common solution strategies on the physical and medium access layer, which can be applied for both. For example, the assumptions on channel knowledge to legacy transceiver and eavesdropper show interesting similarities to underlay cognitive radio, and optimization constraints of both scenarios can be unified. Authors showed furthermore that the same code constructions that are useful to achieve secrecy over the wiretap channel can be used for cognitive relaying.

The tutorial is available on the ACROPOLIS Web Portal under the following link:

http://www.ict-acropolis.eu/index.php?option=com_content&view=article&id=113&Itemid=18

Cluster 2 update

During the period from October to December 2011, joint activities were realized in the context of Cluster 2 for the First Annual Workshop of Acropolis, and presented in Barcelona, Spain, in October 2011. The first paper is titled "Learning in Cognitive Systems: An Overview of Basic Mechanisms and Implementation Approaches" and was developed in the context of WP11 as a joint work between UPRC and UNIS. The second paper entitled "Role of neighbour discovery in distributed learning and knowledge



sharing algorithms for cognitive wireless networks" was developed as a joint activity between WP11 and WP10 of Cluster 2 and UniRoma1 and UPRC. Moreover, presentation on "Learning in Cognitive Systems: An Overview of Basic Mechanisms and Implementation Approaches" was made in the context of the First Annual Workshop of Acropolis for WP11 work. More specifically, various basic learning functionalities and relevant requirements for the identification, collection and processing of information that can lead to exploitable knowledge were presented. Also, an overview of implementation approaches for these functionalities that exploit diverse machine learning techniques were discussed.

The 2012 Summer School will be co-organised by UPRC and IASA in Greece, in July 2012. UPRC will organise a WP11 Session on "Learning Mechanisms and Knowledge Management".

Cluster 3 update

During the past three months a number of joint activities in Cluster3 have addressed the aspects of the Decision process. One of them specifically focused on the delivery of deliverable, D12.1 – "Specification of Preliminary Set of Appropriate Metrics, Utility Functions and Layer Identification". The content of the deliverable is especially valuable to the decision making because it defines the metrics, layers as well as the appropriate utility functions that impact the given process. Part of the activities have also



started to shape the D12.2 deliverable that concentrates on the policy frameworks as a possible mechanism that enables the decision making (This deliverable is in progress). Additionally Cluster 3 had a prolific period in terms of joint collaborations between partners in the area of decision making. Namely, part of the collaboration work, between RWTH and IASA, that targets the interference management in femtocells resulted in a paper submission to the IEEE WCNC 2012 conference. On the other hand UNIS and UPRC have also been intensively collaborating, focusing on spectrum aggregation as one of the main problems in future cognitive radio networks. Their collaboration have yielded in a paper submission to the IEEE ICC 2012 conference. UKIM and UNIS have also been having a fruitful collaboration that focuses on the policy definitions and frameworks and tend to submit their work as a magazine paper in the forthcoming months.

The highlight of the joint activities considering the Action process, in the period from October to December 2011, is the research collaboration between KTH,PUT and TUD in the field of Signal processing techniques for overlay Cognitive Radio. This collaboration represents a cross-cluster activity covering different research areas spanning from fundamental research methods and technical enablers (Cluster 1) up to adaptive signal processing techniques (Cluster 3) and has resulted in a joint paper submission to WCNC 2012 conference. Additionally part of the joint work, in terms of the Action process, has been focused on the preparation of deliverable D13.1, that elaborates and describes a unified collection of signal processing algorithms for spectrum sharing in cognitive radio networks (This deliverable is in progress).

In terms of the Conformance Monitoring and Security issues in cognitive networks the work in the cluster has provided one public deliverable targeting the description of the metrics, which can be used to evaluate the conformance of cognitive radio-enabled networks and devices (D14.1 – "Description of the validation and certification metrics") as well as one ongoing collaboration, between UKIM and JCR, in terms of the security issues in policy controlled cognitive radio systems. Namely one part of this collaboration has resulted in a joint paper submission to the NTMS 2012 conference.

Preliminary Program

February 20th

- 8:30 - 9:00: Registration
9:00 - 9:15: Welcome and Overview of the School
9:15 - 10:45: Lecture 1 (R. Pacalet)
11:00 - 12:30: Lecture 2 (F. Clermidy)
12:30 - 13:50: Lunch at Oasis Restaurant of Mediagarden hotel
14:00 - 16:00: OpenAirInterface.org and WARP Labs
16:00 - 18:00: OpenAirInterface.org and WARP Labs

February 21st

- 8:50 - 9:00: Introduction to day 2
9:00 - 10:30: Lecture 1 (P. Svoboda)
10:45 - 12:15: Lecture 2 (T. Korakis)
12:15 - 13:50: Lunch at Oasis Restaurant of Mediagarden hotel
14:00 - 16:00: OpenAirInterface.org and WARP Labs
16:00 - 18:00: OpenAirInterface.org and WARP Labs

February 22nd

- 8:50 - 9:00: Introduction to day 3
9:00 - 10:30: Lecture 1 (W. Dabbous/T. Turletti)
10:45 - 12:15: Lecture 2 (TBD)
12:15 - 13:50: Lunch at Oasis Restaurant of Mediagarden hotel
14:00 - 16:00: OpenAirInterface.org and WARP Labs
16:00 - 18:00: OpenAirInterface.org and WARP Labs

of NEPI: Network Experimentation Programming Interface.

Venue and Registration

The workshop will take place at EURECOM's premises on the 20-22 of February, 2012, at the "Centre International de Communication Avancée", 2229 Route des Cretes, 06560, Valbonne, Provence-Alpes-Côte d'Azur, France. There is no registration fee for the school but attendees are advised to register with the nearby hotel (MediaGarden) for full-board accommodations.

Educational Activities

Acropolis Winter School 2012

The next Acropolis School organized by the Acropolis Consortium will take place in the beautiful French Riviera in **Sophia Antipolis, hosted by EURECOM, February 20-22, 2012**



The school's website is:

<http://www.eurecom.fr/pages/Acropolis/AcropolisWeb.htm>

The school's main focus will be on experimental methods in wireless communications. In particular, it will be an opportunity for students to conduct experiments on two different experimental platforms, namely the Rice University WARP platform (organized by the Institute for Networked System, RWTH Aachen) and ExpressMIMO and CBMIMO1 OpenAirInterface.org platforms from EURECOM (organized by the Mobile Communications Department of EURECOM). Additionally to this, several lectures by experts in the field will enrich the school's program and help create a successful, stimulating winter school!

In addition several morning lectures (at least two per day) will be given by experts in the field of experimentation for wireless communications. The current list of committed speakers is:

- Renaud Pacalet (TelecomParisTech, Sophia Antipolis) : Flexible Hardware and Software architectures for Wireless Communications
- Fabien Clermidy (CEA-LETI, Grenoble): An overview of the MAGALI platform.
- Philipp Svoboda (Technical University of Vienna) : Measurement and Modelling of Traffic for Efficient Wireless Network Simulation .
- Thanasis Korakis (CERTH (Greece)/New York Polytechnic University) : Methodology and framework for experimental oriented research on wireless testbeds.
- Walid Dabbous/Thierry Turletti (INRIA Sophia Antipolis): An overview

Acropolis Summer School 2012

The Summer School 2012 will take place at the beginning of September 2012. It will be co-organized by IASA and UPRC in a beautiful suburb on the coast near Athens. The School will be devoted uniquely to Cluster 2 related topics with a particular effort to combine the theoretical aspects as well as practical implementation of Context Awareness and Learning. In particular, topics such as: learning techniques for cognitive wireless networks, policy derivation and distribution in cognitive wireless networks, protocols and algorithms for knowledge sharing in cognitive wireless networks, routing in cognitive networks, MAC in cognitive networks, awareness at the local level, cognitive pilot channels for network discovery, localization methods, cooperative sensing, radio interference field estimation, multi-RAT solutions in multiple network scenarios, etc., will be covered during the School. All School lecturers will be distinguished researchers and engineers from various European countries.

1st Acropolis course completed

The first Acropolis Course was completed successfully and includes a series of voice-recorded slideshow presentations. The lectures cover the majority of Cluster-1 related topics and the total duration of the course exceeds 15 hours. Lectures include:

- An Information Theoretic Introduction to Cognitive Radio (KTH),
- Cognitive Management Systems for enabling Future Internet Architectures and Scenarios (UPRC),
- Opportunistic Networks for enabling Future Internet Applications and Scenarios (UPRC),
- Practical Implementation of different Spectrum Sensing Techniques (UKIM),
- Spectrum Sensing and Management in Cognitive Radio Networks (UoS),
- Introduction to Flexible Radio Concepts (IASA),
- Fundamentals of Software Defined Radio and Cognitive Radio (PUT).

The course is open to all consortium members.

Latest Publications

Book Chapters

- ✓ H. Bogucka, P. Kryszkiewicz, A. Kliks, O. Holland, „Holistic Approach to Green Wireless Communications based on Multicarrier Technologies,” Book chapter accepted for publication in "Green Communications: Theoretical Fundamentals, Algorithms, and Applications", Auerbach Publications, CRC Press, Taylor & Francis Group.
- ✓ A. Aijaz, O. Holland, P. Pangalos, H. Aghvami, H. Bogucka, “Energy Savings for Mobile Communication Networks through Dynamic Spectrum and Traffic Load Management,” Book chapter accepted for publication in "Green Communications: Theoretical Fundamentals, Algorithms, and Applications", Auerbach Publications, CRC Press, Taylor & Francis Group.
- ✓ D. Quintas, O. Holland, H. Aghvami, H. Bogucka, “Overview of Energy Saving Techniques for Mobile and Wireless Access Networks,” Book chapter accepted for publication in Handbook on "Green Information & Communication Systems", Elsevier, 2012.

Conference papers

- ✓ J. Lv, R. Blasco-Serrano, E. A. Jorswieck, R. Thobaben, A. Kliks, “Optimal Beamforming in MISO Cognitive Channel with Degraded Message Sets”, IEEE Wireless Communications and Networking Conference (WCNC), Paris, France, 2012.

Journals

- ✓ A. Bantouna, V. Stavroulaki, Y. Kritikou, K. Tsagkaris, P. Demestichas, K. Moessner, "An Overview of Learning Mechanisms for Cognitive Systems," accepted to EURASIP Journal on Wireless Communications and Networking, Special Issue on "Ten Years of Cognitive Radio: State of the Art and Perspectives".

This paper analyses the advantages and the way that networks gain benefits from Cognitive Systems. Moreover, since such systems are closely related to machine learning, the focus of this paper is also placed on machine learning techniques applied both in the network and the user devices side. In particular, celebrating ten years of Cognitive Systems, this survey-oriented paper presents an extended state-of-the-art of machine learning applied to cognitive systems as coming from the recent research and an overview of three different learning capabilities of both the network and the user device.

- ✓ M. Paradia, Y. Kritikou, V. Stavroulaki, P. Demestichas, G. Dimitrakopoulos, S. Glavas, N. Mitsis, "Introducing Cognition in Web-Based, Learning Management Systems for Vocabulary Teaching," Network and Communication Technologies journal, Canadian Center of Science and Education, accepted for publication, 2011.
- ✓ M. Shaat and F. Bader, "Optimal Resource Allocation in OFDM-Based Cognitive Networks with Multiple Relays," accepted for the IEEE Transaction on Wireless Communications Letters.
- ✓ M. Shaat and F. Bader, "Efficient Resource Allocation Algorithm for Uplink in Multicarrier Based CR Networks with Fairness Consideration," accepted for IET Communications Journal, Volume 5, Issue 16, pp. 2328-2338, Nov 2011

- ✓ A. Zalonis, N. Dimitriou, A. Polydoros, J. Nasredinne, P. Mahonen, "Femtocell Downlink Power Control based on Radio Environment Maps", IEEE Wireless Communications and Networking Conference (WCNC), Paris, France, 2012.
- ✓ J. Lv, E. Jorswieck, R. Blasco-Serrano, R. Thobaben, A. Kliks, "Linear Precoding in MISO Cognitive Channels with Degraded Message Sets", 16th International ITG Workshop on Smart Antennas (WSA 2012), Dresden, Germany, March 7-8, 2012.
- ✓ A. Kliks, P. Sroka, J. Lv, R. Thobaben, E. Jorswieck, R. Blasco-Serrano, "Crystallized Rate Regions in the Secondary Interference Channels", 16th International ITG Workshop on Smart Antennas (WSA 2012), Dresden, Germany, March 7-8, 2012.
- ✓ M. Shaat and F. Bader, "Joint Subcarrier Pairing and Power Allocation for DF-Relayed OFDM Cognitive Systems," at IEEE Global Communications Conference (IEEE GLOBECOM'2011), Houston, Texas, USA, December 2011.
- ✓ M. Shaat and F. Bader, "Optimal and Suboptimal Resource Allocation For Two-Hop OFDM-Based Multi-Relay Cognitive Networks," accepted in the 22nd Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC'2011), Toronto, Canada, 11-14 September, 2011.
- ✓ A. Galindo, L. Giupponi, "Downlink Femto-to-Macro Interference Management based on Fuzzy Q-Learning," in Proc. of the Third IEEE International workshop on Indoor and Outdoor Femto Cells (IOFC 2011), Princeton, USA, May 13, 2011.
- ✓ A. Galindo, L. Giupponi, M. Majoral, "On Implementation Requirements and Performances of Q-Learning for Self-Organized Femtocells," FEMNET Workshop at IEEE GLOBECOM 2011, Texas, USA, December 2011.
- ✓ G. Quer, N. Baldo, M. Zorzi, "Cognitive Call Admission Control for VoIP over IEEE 802.11 using Bayesian Networks," at IEEE Global Communications Conference (IEEE GLOBECOM 2011), Houston, Texas, USA, December 2011.
- ✓ B. Bojovic, N. Baldo, J. Nin-Guerrero and P. Dini, "A Supervised Learning Approach to Cognitive Access Point Selection," at IEEE Global Communications Conference (IEEE GLOBECOM 2011), Houston, Texas, USA, December 2011.
- ✓ B. Bojovic, N. Baldo and P. Dini, "A Neural Network Based Cognitive Engine for IEEE 802.11 WLAN Access Point Selection," 9th Annual IEEE Consumer Communications and Networking Conference (IEEE CCNC 2012), Las Vegas, USA, January 2012.

Standardization Efforts

IEEE DySPAN-SC

Significant progress has been made with DySPAN-SC and the IEEE 1900 working groups that it oversees, particularly at its recent meeting in Scottsdale, Arizona, USA.

Work within P1900.6a, the amendment to the recently published IEEE 1900.6 standard on "Interfaces and data structures for advanced radio systems", is continuing. This amendment aims to extend the initial interface definitions and provide concrete use cases that are attractive to industry. The window of opportunity for contributions to IEEE 1900.6a to be included in the new standard will be open until approximately March/April 2012.

KCL, Uniroma1 and PUT have created a IEEE 1900.6 contribution proposing an amendment to the interfaces defined in the standard in order to allow for information on proximity, connectivity and channel awareness to be exchanged between devices. Moreover, the same three universities, led by KCL, have proposed extended use cases for 1900.6, pertaining to energy efficiency and other benefits as facilitated by the standard. Both contributions were successful.

ACROPOLIS members are also particularly active in IEEE 1900.1, aiming to define various terms in the area of DSA, as Vice-Chair and Technical Editor of the developing IEEE 1900.1a amendment standard. An initial completed version of this amendment has recently been produced, with ACROPOLIS playing a highly significant part in its creation. Moreover, ACROPOLIS members are participating in the newly-created IEEE P1900.7 working group on a radio interface for a range of white space use cases and spectrum bands. Future ACROPOLIS contributions to IEEE P1900.7 are anticipated.

ETSI RRS

From 21st to 23rd November 2011 in JRC, Ispra, Italy joint ETSI RRS WG1 and WG3 face-to-face meeting was held. After short discussion on the IPR issues, the following technical reports were widely elaborated:

- TR 103 067 "Feasibility study for Radio Frequency (RF) performances for Cognitive Radio Systems operating in UHF TV band WS",
- TS 102 946 "System requirements for Operation in UHF TV Band White Spaces System requirements for Operation in UHF TV Band WS",
- TR 102 947 "Use Cases for building and exploitation of Radio Environment Maps for intra-operator scenarios",
- TS 102 968 "System requirements for Reconfigurable Radio Systems operating in IMT-Bands and GSM-Bands for intra-operator scenarios",
- TR 102 967 "Use Cases for Dynamic Declaration of Conformity",
- TS 102 908 "Coexistence Architecture for Cognitive Radio Networks on UHF White Space Frequency Bands",
- TR 101 571 "Feasibility study for coexistence between CRS and RF Cable Networks",
- TR 102 684 "Feasibility Study on Control Channels for Cognitive Radio Systems".

Furthermore, discussion on working document as well as information on device classification related to liaison statement preparation for SE43 was conducted. Finally, new work item on security related scenarios and threats in reconfigurable radio systems was proposed by Gianmarco Baldini from JRC and next meetings time schedule was set by participants.

Industry Section

Dear reader,

In Industry Section of the fifth ACROPOLIS e-Newsletter issue we have prepared for you a short summary of the first ACROPOLIS Industry Workshop. Furthermore, the first ACROPOLIS Interview with an Expert was also finalized and incorporated in this document. We hope that you will enjoy this materials.

Note that we will do all our best to make this industry section interactive and in line with your interests. To this end, we would like to kindly solicit submission of your comments and propositions regarding the contents of this section. In case of any remarks, please do not hesitate to contact the industry section editor, Kamil Chudas (kamil.chudas@eitplus.pl).

Reflections from the first ACROPOLIS Industry Panel

5th October 2012, Barcelona

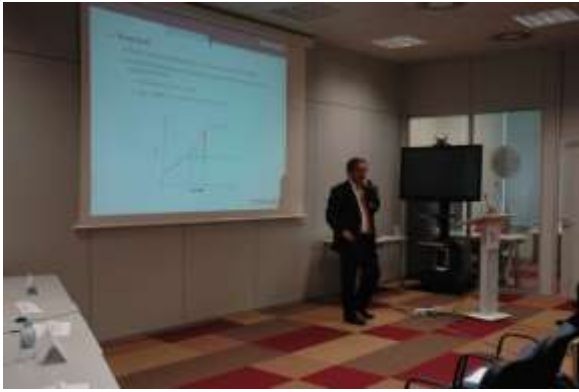


One of the main activities performed under the umbrella of ACROPOLIS Industry Partnership Program are annual project industry workshops, where ACROPOLIS Partners have an opportunity to disseminate latest results of their research while participating industry representatives provide their views on the market orientation of CR technologies and hence facilitate uptake of ACROPOLIS results in market relevant domains. The first ACROPOLIS Industry Workshop was held in Barcelona, Spain, in October 2011 at CTTC Demo – Centre premises. This took the form of an industrial panel discussion which followed short introductory talk on IPP's aims and achievements and session of presentations prepared by invited industry representatives.

1st Industry Panel - Presentations

- "Cognitive Radio and Networks: Issues, Challenges and Opportunities"
T. Russell Hsing, Telcordia Technologies, USA
- "ITU activity concerning the Cognitive Radio Systems"
Fryderyk Lewicki, Orange Labs, Poland
- "A fixed operator view on Cognitive Radio technologies"
Michael Fitch, BT Research, United Kingdom
- "Cognitive Radio in professional wireless networks – First steps challenges"
Christophe Le Martret, THALES, France
- "Cognitive radio spectrum efficiency and coexistence"
James 'Jody' Neel, CRT, USA





During the meeting, panellists put attention on major real implementation issues and most promising deployment scenarios of cognitive radio. In particular, intelligent transportation systems and vehicular networks were discussed as an instant of real solutions already being under development and provided to the market. However, lack of large scale deployment of test beds in outdoor environment was noticed. Considerable part of the workshop was devoted to TV Whitespace (TVWS) and here some technical issues were sketched out. It is worthy to cite that potential availability of TVWS vary greatly depending if we allow opportunistic use of adjacent

channels or not (in United Kingdom amount of vacant spectrum available for 50% of population could be 200 or 100 MHz, respectively). Obviously, higher reusing factor carries higher technical requirements. Another significant remark was that global database could solve the problem of unknown location of licensed radio microphones which transmission cannot be interfered by secondary users. In case of general implementation issues, the panellists put attention on scaling (taking in simulations more than 2 parallel links), protocols (considering signalling feasibility and cost) and assumption bounds including finite MCS and implementation cost. Furthermore, shifting from research on sensing of primary users to research on fostering means of inducing database-mediated cooperation from primary users and shifting from real-time genetic algorithms and simulated annealing to case-based reasoning as well as integrating awareness of the user domain and addressing security and stability concerns that arise from interactive and emergent cognitive radio network behaviours were suggested to whole academic sector conducting research on cognitive communications.

The first ACROPOLIS Industry Panel gathered several dozen of both industry and academic sector representatives. It was carefully prepared and conducted in very friendly atmosphere. The audience was lively interested in showed presentations and actively participating both discussions following particular presentations as well as general panel discussion. It is notable that whole Industry Panel has been taped and thus, now relevant records are available on ACROPOLIS Website under the following link:

http://www.ict-acropolis.eu/index.php?option=com_content&view=article&id=114&Itemid=45.

Presentations can be downloaded from here:

http://www.ict-acropolis.eu/index.php?option=com_content&view=article&id=111&Itemid=45.



Interview with Dr Przemysław Pawełczak

Wroclaw-Berlin, 8th December 2011

You have noted that while the US still dominates research and development of CR/DSA like systems, almost 60 percent of the demos are from Canada, the EU and Asia. What are the R&D themes and priorities and how do they differ across Asia, Europe and US/North America?

Generally speaking, there are no significant differences between R&D priorities of the EU and the US. The main research topics in an area of cognitive radio are the same – energy efficiency, security etc. However, the sources of funding differs. While in EU most of the research projects devoted to cognitive communications are sponsored by civilian bodies, in the US major part of such research is supported directly by government, in particular, military agencies (e.g. DARPA, US Army Research, etc.).



Przemysław Pawełczak was born in Tomaszów Lubelski, Poland in 1980. He received the MSc degree from Wrocław University of Technology, Wrocław, Poland, in 2004 and the PhD degree from Delft University of Technology, Delft, The Netherlands. From 2004 to 2005 he was a staff member of Siemens COM Software Development Center, Wrocław, Poland. During Fall 2007 he was a Visiting Scholar at the Connectivity Lab, University of California, Berkeley. Between 2009 and 2011 he was a postdoctoral researcher at the Cognitive Reconfigurable Embedded Systems Lab, University of California, Los Angeles. Currently he is a Senior Researcher at Fraunhofer Heinrich Hertz Institute, Berlin. His research interests include cross-layer analysis of opportunistic spectrum access networks. Dr. Pawełczak was a vice-chair of IEEE SCC41 Standardization Committee between 2009 and 2011. He was a coordinator and an organizing committee member of cognitive radio workshops collocated with IEEE ICC in 2007, 2008, and 2009 and an organizing committee member of ACM CoRoNet workshops. Since 2010 he has been a co-chair of the demonstration track of IEEE DySPAN. He was nominated for 2011 UCLA Chancellor Award for Postdoctoral Research and he was the recipient of the annual Telecom Prize for Best PhD Student in Telecommunications in The Netherlands in 2008 awarded by the Dutch Royal Institute of Engineers.

You have spent some time in UCLA. Did you notice any significant differences in how investigations on Cognitive Radio is conducted by American and European researchers? Any noteworthy differences in research approach, methodology etc.?

Again, I haven't noted any large differences in this area. In high-ranked research institutes in the US and EU the tools and methodology are similar. However, the procedure of acquiring funding for research is easier in the US than in the EU. Of course, the competition is also very strong, but, from my point of view, the administrative overhead in America is much less than in the EU. The natural reason is that there is one country with one language and more consistent regulations. In Europe, when one wants to create international consortium, has to cope with plenty of problems. The same issues occur during the project lifetime when one has to submit regularly administrative reports.

Which cognitive technology capabilities need the biggest research efforts due to their current underdevelopment? In other words, which aspects of current communications technology form a bottleneck on the path towards Cognitive Radio implementation?

From a technical point of view the problem is still how to efficiently dig up the radio resources in environment where other users allocate their operating channels in a dynamic manner. It is not a big challenge to find a TV white space due to its inherent, slowly changing channel allocations. The real problems occur when we want to find free resources and operate not causing distortion to primary users in cellular telephony-like environment. From the non-technical point of view the critical matter is a lack of relevant regulations, widely valid policies etc. Without those regulations broad deployment of cognitive radio-like systems is impossible.

In your career you encounter various test beds focusing on CR capabilities. Which of them seem to you to be the most mature and close to the implementation of real Cognitive Radio? Which features of Cognitive Radio are still not present in test beds' demonstrations?

Each of those test beds was good. Unfortunately most of them operated only in ISM band and thus not addressed the implementation of a whole network. I think the main reason of such immaturity of those academic platforms comes from the fact that universities do not fund such investigation as they do not see clear benefits from that (product vs paper trade-off). But reverting to my experiences with test beds, in particular I would point out two platforms: WhiteFi by Microsoft and trials by XG Technology. The former is noteworthy because it was a first trial developed by company (not directly sponsored by military agencies). The latter was the first test bed presenting real opportunistic allocation in environment with primary and secondary users.

You have noted that ad hoc and sensor networks might benefit the most from the introduction of the additional capacity CR offers; in which domains may we

being to see these benefits emerging?

Mainly in systems which suffer from scarcity of resources. The classic instances are the emergency systems used by police, army, ambulance services etc. which are critically congested in case of disaster.

How about a killer app?

Today it is difficult to break through with a new "killer app" because of very advanced and diversified services. We should rather expect development of applications in order to provide broadband services in real time, even in unfavourable conditions. The good example may be a concert when hundreds of people want to connect with their friends via mobile phones and transfer in real time high quality movies. It is still a challenging task if, for some reasons, we cannot set occasionally additional base stations in close vicinity of such venues.

It seems that FCC policies become increasingly flexible giving researchers, vendors and operators more and more free hand towards first implementation of pre-Cognitive Radio. What do you think: will European and Asian regulatory bodies follow FCC attitude? May we expect any rapid turnaround in global regulatory policy?

For sure, FCC regulations will change faster than corresponding regulations in Europe because of US convenient geographic circumstances. They border with two countries only and two oceans, so have much less concerns on causing interferences to neighbours. Similar mechanisms we can observe in island countries – a for example Ireland and UK, which faster than the rest of European countries introduced various innovative radio solutions enhancing the systems' radio resource usage flexibility. In continental Europe any significant change in international radio and spectrum regulations have to be preceded by relevant, usually time-consuming negotiations.

There are a wide range of standards being developed for "cognitive radio" related technologies, and particularly for TV Whitespace. Do you think any of these developing standards will dominate in the Whitespace arena? Do you think any are better suited than others to the recent regulatory reality and directions?

In my opinion IEEE 802.11af tends to become a hit. This standard will allow to exploit the white spaces using WiFi devices. Of course the huge potential of that solution lies in worldwide popularity of WiFi standard.

It is noted that spectrum sensing has taken a number of setbacks recently. Do you think it will recover and become recognised as a viable means for spectrum opportunity detection in TV Whitespace and other areas? Do you see alternative use-cases for spectrum sensing that validate its worthiness?

In my opinion, undoubtedly we have to continue the research on spectrum sensing as data bases recommended for cognitive communication in TV bands are not sufficient in a more dynamic radio environments. Moreover, in some circumstances even data bases have to rely on spectrum sensing. We need technologies allowing us to monitor in steady manner systems with rapidly changing resource allocation. Incidentally, the main inducements why the FCC resigned from detection of licensed wireless microphones by spectrum sensing were more economic than technical. They just jumped to conclusion that this is a meaningless market so broad and expensive investigation is unjustified.

"Cognitive radio" is thus-far yet to be accepted, except in the so-called "TV Whitespace" arena in which context it is not really "cognitive radio". Aside from application in ISM and unlicensed bands, do you see any particular spectrum bands or scenarios in which "cognitive radio" can succeed and maximise its potential?

As I mentioned earlier, all applications in public safety services suit the cognitive radio very well and probably, in near future it will be a main deployment scenario for that technology in its original form. The potential of cognitive radio is implicit and indubitable. There are various public bands with almost zero usage which could be exploited in a case of disaster.

Thank you for your time and cooperation.

You are welcome.

Other CR-Related News

News related to COST Action IC0902

On October 5-7 2011 the COST Action IC0902 had its annual workshop in Barcelona Spain, immediately following the First Annual Workshop of Acropolis. The IC0902 workshop, organized by CTTC, and chaired by C. Bader and M.-G. Di Benedetto, was attended by over 70 researchers from all over the world, with participation from both COST countries and non-COST institutions involved in the Action from China, US, and Australia.

The two days and a half program included:

- The panel "Cognitive Radio Networks: Operators Perspective" with representatives from European and US operators sharing their views on the interaction between Cognitive Radio and mobile operators – video recordings of the panel are available on the COST IC0902 website

<http://newyork.ing.uniroma1.it/IC0902> under the Meetings->2011->5th MCM section.

- Over 50 contributions by researchers involved in the Action presenting their latest results relevant to the 5 Working Groups and 4 Interest Groups covering Action activities. Extended abstracts of all contributions are available from the workshop website: <http://ic0902-workshop2011.cttc.es/>.

One of the ongoing efforts in the COST Action IC0902 is the creation of a knowledge platform on Cognitive Testbeds, as a result of a joint initiative by Working Groups 1 and 2. The platform is currently being updated with new content on testbeds available within Action partners, and is expected to be publicly available by the end of the year.

Overview of latest activity in related research projects

OneFIT

UPRC leads the project OneFIT, holding the Project Coordinator position, and participates to the Project UniverSelf, as the deputy work package leader in the Unified Management Framework. FP7 ICT Opportunistic networks and Cognitive Management Systems for Efficient Application Provision in the Future Internet - OneFIT (<http://www.ict-onefit.eu>) Project aims at developing and validating the vision of opportunistic networks that are managed, and coordinated with the infrastructure, by advanced cognitive systems. The project has started in July 2010. During the latest period, the Project works on the prototype data structures and strategies for the integrated cognitive control channel management system (M3.3), as well as interactions and synergies among diverse algorithmic solutions for enabling opportunistic networks (M4.2). Moreover, the project is also very highly active in disseminating the progress and results produced, publishing papers in Journals and Magazines of high impact (such as IEEE Network Magazine, IEEE Vehicular Technology Magazine, Journal of Green Engineering) and international conferences (such as PIMRC, Future Network and Mobile Summit, VTC, GlobeCom). Furthermore, the partners actively participate and contribute to Concertation and Cluster meetings, Fora, Workshops Regulation and Standardisation events. The OneFIT platform has already been demonstrated in major events.

UniverSelf

FP7 ICT UniverSelf (<http://www.univerself-project.eu>) is a Project that aims at overcoming the growing management complexity of future networking systems. The Project has started in September 2010. Members of UniverSelf participated to the guest editing of a Special Issue on "Managing an Autonomic Future Internet", which was finalised and published for November/ December 2011. The partners have and are being involved in the organization of established conferences in the area of network management, such as AIMS 2011 (5th International Conference on Autonomous Infrastructure, Management and Security to be held in Nancy, France, June 13-17, 2011) and CNSM 2011 (7th International Conference on Network and Service Management to be held in Paris, France, October 24-28, 2011). Moreover, UniverSelf currently works on the first complete specification of the UMF, focusing on the information and knowledge management capabilities, the

News related to COST Action IC0905 "TERRA"

COST-TERRA held its 4th Meeting on the 15-17 November in Brussels. This meeting included a number of interesting contributions on various topics, such as:

- R. Chavez-Santiago (Norway): Cognitive radio for wireless area networks in hospital environments
- A. Medeisis (Lithuania): Innovation Economics view of CR development: further analysis
- J. Kibilda (Poland): A protocol for GDA-based spectrum availability determination for CR
- J. Markendahl (Sweden): Business feasibility analysis of use of TVWS for mobile broadband services

Significant progress included further consideration of some interesting use cases for CR, as reflected in the "hospital environments" and "GDA protocol" presentations above, study of coexistence elements of existing solutions or their combinations that would appear most suitable for the identified CR/SDR scenarios, development of a toolbox of techniques to facilitate coexistence, and inputs on advanced coexistence modelling. Furthermore, progress was made in understanding the business implications of regulatory ways forward, reflected in the "innovation economics" and "business feasibility analysis" presentations above. Additionally, an interesting discussion picked up on the concept of a "Dedicated Cognitive Radio Band" as suggested in ACROPOLIS and elsewhere—and led to the preparation of a presentation on the idea: albeit under the tag of "ISM-Advanced", a name which will likely change based on feedback.

governance mechanisms, and intelligence embodiment functionality (D2.2). Moreover, UniverSelf partners are working on preliminary results with respect to parameter optimization methods and ideal cooperation strategies (MS30). Finally, work is currently being done for synthesis of use-case requirements (D4.2), assessment results of Trust in Autonomics (D4.3) and a first prototype of a use-case (D4.4). Additionally, the project has already been involved in two standardization bodies; ETSI AFI Groups and IETF80. Finally, liaisons with relevant research projects and standardization fora are currently investigated, with the aim to create synergies and facilitate exchanges.

COGEU

COGEU (COGnitive radio systems for efficient sharing of TV white spaces in EUropean context - <http://www.ict-cogeu.eu/index.htm>) is 2 years old. Due to this reason the special one day workshop was organized on 10th of October 2011 in Munich by Institut für Rundfunktechnik [IRT]. The title of the workshop was: Can Europe may use of TV White Spaces? The detailed program and presentations of this interesting event may be found at:

http://www.ict-cogeu.eu/diss_workshops.html.

COGEU consortium was also invited to demonstrate its achievements in The Cambridge White Spaces Trial, which took place on 13th December 2011, at Microsoft Research, Cambridge, UK.

Furthermore, COGEU is going to prepare its final demonstrator. Detailed information about existing demos and preparation for the main demo may be found on COGEU website. Those demos were presented to the participants of COGEU workshop. Demos refer to the following topics:

- COGEU final demonstrator (Poster about this issue is available at http://www.ict-cogeu.eu/pdf/COGEU_information3.pdf);



- Database for Wireless Microphones (Working online demo is available at: https://www.est.ipcb.pt/pessoais/alter_mann/index.php);
- Combination of Sensing with Database Access (Video presentation is available at: <http://db.tt/V4DcHud>). This demo was presented on FuNeMS 2011 in Warsaw;
- Advanced DVB-T sensing demo (Presentation about this demo is available at: http://www.ict-cogeu.eu/pdf/Demo_RS.pdf);
- Spectrum shaping for COGEU TV White Spaces devices.

QUASAR

The FP7 QUASAR (Quantitative Assessment of Secondary Spectrum Access) project (<http://www.quasarspectrum.eu/>) aims at bridging the gap between the claims made in conventional cognitive radio research and practical implementation by assessing and quantifying the real-world benefits of secondary (opportunistic) access to primary (licensed) spectrum. Novel approaches are taken towards the conventional notion of detecting spectrum holes and treating the spectrum opportunity discovery as a data fusion problem, considering new interference schemes from multiple secondary users.

QUASAR will provide a comprehensive analysis of the techno-economical environment and provide detailed roadmaps and guidelines on how to apply and analyze new opportunistic spectrum access business models. The project aims to go beyond the current regulatory framework. During the last three months:

- QUASAR has provided input to CEPT ECC SE43 (Cognitive radio systems – White Spaces)
- QUASAR participants (Maziar Nekovee – BT and Tim Inrich - Ericsson) have attended the SE43 meeting in Copenhagen and gave a 20 minute presentation on QUASAR's WP1 (Models, Regulatory and Business impact) focusing on D1.2 (Regulatory feasibility assessment). Additionally, D1.2 was submitted as an information contribution to SE43 working group. M.Nakovee also briefly updated the work group on the work undertaken at BT regarding the trials of rural broadband in TVWS. On the following SE43 meeting, held in Italy, R.Jantti (from Aalto University) presented QUASAR's input on modelling interference from multiple interferers. Both QUASAR presentations (from M.Nekovee and R.Jantti) as well as the input contribution (based on D1.2) were well received by all SE43 members leading to a lively discussion. The SE43 Chair, Alexandre Kholod, expressed his interest in QUASAR to continue to submit its contributions and future presentations to the CEPT ECC SE43 work group at forthcoming meetings.
- partners in QUASAR have jointly collaborated on a number of topics like, sharing strategies for un-aware secondary systems, spectrum assessment methodology, etc. disseminated in M12 and M15 public deliverables which can be found on: <http://www.quasarspectrum.eu/deliverables/110-deliverables.html> as well as a number of publications which can be found on: <http://www.quasarspectrum.eu/downloads/research-publications.html>.

BeFEMTo

During the last months BeFEMTo (<http://www.ict-befemto.eu/>) CR-related activities have been mainly focusing on self-organization of the femtocell network. A deliverable on the topic is about to be sent to the Commission. Thanks to self-organization, the spectral efficiency target of 8 bits/s/Hz/cell is achieved by many of the proposed approaches, while generating minimum OPEX costs.

FARAMIR

The FARAMIR project (<http://www.ict-faramir.eu>) has given a successful demonstration of a radio environment map (REM) based solution for optimized resource allocation in femtocell networks. The demonstration took place during the Orange Labs research exhibition, arranged in Paris on 6-8 December, and was very well received by the high-profile groups of visitors attending the exhibition. As part of the demonstration the FARAMIR partners (including UKIM and RWTH from the ACROPOLIS consortium) illustrated how radio environmental information can be used in conjunction with power control and channel assignment algorithms in both LTE and ISM bands to improve the spectral efficiency of wireless networks. The presented demonstration is an early instance of the integrated FARAMIR radio environment map prototype, which will be further extended during the coming Spring and tested through larger field trials.

Noteworthy Calls

Journal CFPs

- IEEE Journal on Selected Areas in Communications: Cognitive Radio Series

Manuscript Due: January 5, 2012

<http://www.jsac.ucsd.edu/Calls/CRSeriesCFP.pdf>

- ELSEVIER Physical Communication: Special Issue on "Cognitive Radio: The Road for its Second Decade"

Manuscript Due: January 10, 2012

<http://www.elsevier.com/locate/physcom>

- IEEE Wireless Communications Magazine: Special Issue on 'Cognitive Radio Networks: A Practical Perspective'

Manuscript Due: January 15, 2012

<http://dl.comsoc.org/livepubs/pci/info/cfp/cfpwcm0812.htm>

- Hindawi Journal of Electrical and Computer Engineering: Special Issue on Advanced Coexistence Technologies for Efficient Radio-Resource Usage'

Deadline: February 10, 2012

<http://www.hindawi.com/journals/jece/si/erru/>



CrownCom 2012

18 - 20 June 2012 - Stockholm, Sweden

This 7th International ICST Conference on Cognitive Radio Oriented Wireless Networks and Communications provides a venue for researchers to propose new solutions to the technical, regulatory and technological problems related to the cognitive radios. During the conference ACROPOLIS Special Session will be held.

ACROPOLIS Special Session

On the Cognitive Radio Implementation - the ACROPOLIS vision

Organizers: Eduard Jorswieck, Adrian Kliks, Ragnar Thobaben

This session aims to present the research results of the European Network of Excellence in Cognitive Communications ACROPOLIS. You are invited to submit papers covering, but not limited to, the following categories related to Cognitive Radio:

- Cognitive and opportunistic radios and networks
- Primary secondary co-operation
- Hardware implementation issues testbeds and demonstrators
- Advanced spectrum management strategies
- Spectrum sensing and geolocation database solutions
- Dynamic spectrum sharing
- Flexible Radio Resource Management (RRM)
- Flexible air interfaces and radio access technologies
- Adaptive transmission techniques for CR
- Self-organization

Submission deadline: 16th January 2012

Notification of acceptance: 27th February 2012

Camera ready: 23rd March 2012

The proceedings of the 7th International Conference on Cognitive Radio Oriented Wireless Networks and Communications will be published in the IEEE Xplore database. To submit your paper please upload it on the ICST/EAI submission system, available on the official CrownCom2012 web site. Please, provide ALSO the paper directly to Adrian Kliks (e-mail: akliks@et.put.poznan.pl). Please, inform us of your intention to submit a paper as soon as possible.

Web-Page: <http://www.crowncom.org/2012/>

**WTS 2012****18-20 April 2012 - London, UK**

The Wireless Telecommunications Symposium brings together industry professionals and academics from companies, governmental agencies, and universities around the world to exchange information on advances in mobile communications and wireless networking technology, applications, management, and security. The theme for WTS 2012 will be "Global Wireless Communications: A European Perspective".

January 24, 2012 – Initial Full Paper and Tutorial/Workshop SubmissionsWeb-Page: <http://www.csupomona.edu/~wtsi/wts/call4papers.htm>**European Wireless Conference (EW 2012)****18-20 April, 2012 - Poznań, Poland**

The 18th European Wireless Conference (EW 2012) will be hosted by Poznań University of Technology (ACROPOLIS Partner) with the cooperation of Polish Society of Theoretical and Applied Electrical Engineering.

The 2012 edition is aimed at addressing a key theme on "Cooperative Communications". Cooperative algorithms in the physical and higher layers help in approaching theoretical performance limits of wireless systems.

January 15, 2012 – Paper SubmissionWeb-Page: <http://www.ew2012.org/Call-For-Papers>**The First International Workshop on Emerging Cognitive Radio Applications and Algorithms (CORAL 2012)****June 25, 2012, San Francisco, CA, USA**

In this workshop identification, development and assessment of emerging applications of CR networks will be addressed and reflected on the current state-of-art implementation of CR systems. At the same time, methodologies, techniques and algorithms that are required to fully realize the potential of CR technology will be also investigated. This includes the new paradigms and multidisciplinary techniques that can be considered for CR management, organization and control under the algorithmic viewpoint.

February 5, 2012 – Paper SubmissionWeb-Page: <http://www.cs.unibo.it/coral2012/coral2012.html>

**IEEE Wireless Communications Magazine****Special issue on “Cognitive Radio Networks: A Practical Perspective”**

The objective of this special issue is to present a collection of high-quality papers that report the latest research advances in the design and implementation of cognitive networking, as well as survey papers on the major challenges and possible solutions that lead the path to real-world cognitive radio systems.

We solicit both academic and industrial contributions, which are original, previously unpublished and not currently under review by another journal.

The submitted papers should focus on practical aspects of cognitive radio networks, system design issues, implementations/testbeds, or measurements in real environments. Topics of interest include, but are not limited to:

- Centralized and distributed spectrum coordination services
- Regulation issues and use cases
- Practical applications and standards for cognitive radio (IEEE802.22, IEEE SCC41, ...)
- Radio spectrum maps, database and usage of white spaces
- Software defined radio solutions
- Coexistence among heterogeneous wireless technologies (cellular, WiFi, ...)
- Implementation of sensing and dynamic spectrum management
- Design and implementation of cognitive MAC and network-layer protocols
- Physical layer and advanced signal processing
- Cross-layer optimization and reconfiguration solutions
- Security in cognitive radio networks
- Machine learning and pattern recognition for network identification
- Evaluation of different design and implementation choices (e.g., sensing vs. use of radio spectrum maps)
- Feasibility and implementation challenges of cognitive radio solutions in real devices
- Testbed and field trials with cognitive radio networks

Authors must follow the IEEE Wireless Communications Magazine guidelines for preparation of the manuscript and submit it via Manuscript Central at <http://mc.manuscriptcentral.com/ieee-wcm>

Submission Schedule

- **Manuscript Submission: January 15, 2012**
- Notification of acceptance: April 15, 2012
- Final Manuscript Due: May 15, 2012
- Publication: August 2012

Guest Editors

Carla-Fabiana Chiasserini, Politecnico di Torino, Italy, Email: chiasserini@polito.it

Maria-Gabriella Di Benedetto, University of Rome “La Sapienza”, Italy, Email: gaby@acts.ing.uniroma1.it

Xiangpeng Jing, EMC Corporation, USA, Email: xjing@winlab.rutgers.edu

Ping Zhang, Beijing University of Posts and Telecommunications, China, Email: pzh@bupt.edu.cn

Upcoming Conferences

Conference Acronym	Conference Full Name / Website	Paper Submission deadline	Conference date	Location
INFOCOM 2012	IEEE International Conference on Computer Communications http://www.ieee-infocom.org/2012/	Closed for Papers	25-30/03/2012	Orlando, Florida, USA
WCNC 2012	IEEE Wireless Communication and Networking Conference http://www.ieee-wcnc.org	Closed for Papers	01-04/04/2012	Paris, France
DySPAN 2012	IEEE International Dynamic Spectrum Access Networks Symposium http://www.ieee-dyspan.org	Closed for Papers	03-06/04/2012	Bellevue, Washington, USA
EW 2012	European Wireless Conference http://www.ew2012.org/Call-For-Papers hosted by PUT (an ACROPOLIS partner)	15/01/2012	18-20/04/2012	Poznan, Poland
WTS 2012	11th Wireless Telecommunications Symposium http://www.csupomona.edu/~wtsi/wts/call4papers.htm	24/01/2012	18-20/04/2012	London, UK
VTC 2012 Spring	IEEE 75th Vehicular Technology Conference http://www.ieeevtc.org/vtc2012spring/	Closed for Papers	06-09/05/2012	Yokohama, Japan
CIP 2012	Third International Workshop on Cognitive Information Processing http://cip2012.tsc.uc3m.es/	15/01/2012	28-30/05/2012	Pontevedra, Spain
ICC 2012	IEEE International Conference on Communications http://www.ieee-icc.org/2012/index.html	Closed for Papers	10-15/06/2012	Ottawa, Canada
CROWNCOM 2012	7th International ICST Conference on Cognitive Radio Oriented Wireless Networks http://www.crowncom.org/2012/ includes an ACROPOLIS Special Session	16/01/2012	18-20/06/2012	Stockholm, Sweden
CORAL 2012	The First International Workshop on Emerging Cognitive Radio Applications and Algorithms http://www.cs.unibo.it/coral2012/coral2012.html	05/02/2012	25/06/2012	San Francisco, CA, USA
ITW 2012	IEEE Information Theory Workshop http://itw2012.epfl.ch/	02/04/2012	03-07/09/2012	Lausanne, Switzerland
PIMRC 2012	International Symposium on Personal, Indoor and Mobile Radio Communications http://www.ieee-pimrc.org/2012/	01/03/2012	09-12/09/2012	Sydney, Australia
GLOBECOM 2012	IEEE Global Communications Conference http://www.ieee-globecom.org/2012/index.html	15/03/2012	03-07/12/2012	Disneyland Hotel Anaheim, California, USA

ACROPOLIS Contacts

Aachen office and Coordinator:

Sylwia Romaszko	<i>Project Manager</i>	sar@inets.rwth-aachen.de
Petri Mähönen	<i>Coordinator</i>	pma@inets.rwth-aachen.de

Athens office:

Andreas Polydoros	<i>Deputy & Science Coordinator</i>	polydoros@phys.uoa.gr
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London office:

Oliver Holland	<i>Head of the London Office</i>	oliver.holland@kcl.ac.uk
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