IEEE DySPAN 2007
Information for conference program

1.1 Overview

IEEE DySPAN 2007 features the world's first trials of innovative cognitive radio, cognitive networks and dynamic spectrum access technologies operating in dedicated licensed and licensed-exempt channels in the TV and microwave frequency bands. The demonstrations and trials comprise a combination of fixed-location demonstrations in the conference venue and Trinity College Dublin, in addition to mobile operation in the greater Dublin area. To facilitate the demonstrations, the Commission for Communications Regulation (ComReg) has awarded a trial licence to Ireland's Centre for Telecommunications Value-Chain Research (CTVR) along with the participating demonstrators as third party collaborators under ComReg's Wireless Trial licence scheme for the period April 2nd - May 1st 2007.

Demonstrations and trials are primarily taking place during the DySPAN conference period (April 16th–20th, 2007) in addition to some prior experiments all taking place in collaboration with CTVR. At the conference, delegates can see this leading-edge research in action and receive updates of the exciting expected outcomes of this unique opportunity as they occur. Through the experiments and demonstrations, the DySPAN 2007 conference will showcase technology developments and help initiate collaborative research among demonstrators with complementary expertise and common objectives. Furthermore, spectrum data collected during the demonstrations will be made available to attendees.

The test and spectral analysis tools for these trials are being kindly sponsored by Anritsu. Anritsu is widely acknowledged as the world-leading supplier of professional spectrum monitoring and analysis equipment.

1.2 Trial licence details

Excluding the licence-exempt frequency bands in the 2.4 GHz and 5-5.8 GHz frequency ranges, demonstrators acting in collaboration with the Centre for Telecommunications Value-Chain Research at Trinity College Dublin are permitted to use the channels listed in Table 1.1.

Table 1.1: Table of COMREG trial licence channels and conditions.

Channel	Centre Freq (MHz)	Max ERP	BW (MHz)	Mobile
1	231.2250	1 W (0 dBW)	1.75	Yes
2	233.0250	1 W (0 dBW)	1.75	Yes
3	234.8250	1 W (0 dBW)	1.75	Yes
4	236.6250	1 W (0 dBW)	1.75	Yes
5	238.4250	1 W (0 dBW)	1.75	Yes
6	386.8750	1 W (0 dBW)	1.75	Yes
7	396.8750	10 W (10 dBW)	1.75	Yes
8	406.9750	1 W (0 dBW)	1.75	Yes
9	408.7750	10 W (10 dBW)	1.75	Yes
10	436.8750	1 W (0 dBW)	1.75	Yes
11	2056.0000	1 W (0 dBW)	50	No
12	2231.0000	1 W (0 dBW)	50	No
1A	234.8250	1 W (0 dBW)	8.95	Yes

1.3 A synopsis of the demonstrations

Shared Spectrum Company Shared Spectrum Company's demonstration is comprised of two parts. The first part includes the presentation of live and recently captured spectrum occupancy measurements in Dublin city taken as a motivation of the potential channels that can be harvested by XG radios. Secondly, SSC provides a live demonstration of their XG radio system in the presence of legacy radios using the channels allocated by the ComReg trial licence issued for DySPAN 2007. XG network formation and interference avoidance features are demonstrated also.

Motorola Labs Motorola Labs demonstrate an experimental cognitive radio system using the DySPAN licensed spectrum under ComReg's wireless trial licence scheme. To exercise a practical communications link in a shared spectrum, the system provides a live video feed via a dynamically-allocated OFDM physical layer. Each demonstration unit includes a RF signal conditioning module for DySPAN channel allocations, a custom RF transceiver IC, digital signal processing, a cognitive communication stack, and an embedded Linux operating system. Connected to the units via Ethernet, a PC presents a graphical user interface, including the video feed and visualization of the spectral sensing, signal detection, and dynamic frequency allocation that is taking place in the units.

SRI International SRI International has designed a cognitive radio policy language (CoRaL); a language to capture rules and regulations for opportunistic spectrum use. A policy reasoner that reasons about these spectrum-sharing policies can be used with cognitive radios to guarantee policy-specified behaviors. SRI demonstrates this reasoner on various policies including those established for the DySPAN trial licence. The effects of enforcing these policies and how a radio adapts to the conditions of dynamically changing environments are highlighted. The reasoner is linked to a live sensor that measures the state of the spectrum at the conference site and delivers input data for the reasoner. In addition, the ease of changing policies and uploading new policies is shown.

QiniteQ An automatic monitoring system (AMS), developed by a QinetiQ led team under an Ofcom spectrum efficiency scheme (SES) research programme is being demonstrated. The AMS sensors are able

to monitor the radio spectrum usage automatically and provide precision location of signal sources using time difference of arrival (TDOA) techniques. The sensors, which can be deployed individually or as part of a remotely operated network, have been designed to provide a 24/7 monitoring capability, using low cost commercially available hardware combined with QinetiQ's proven software applications. QinetiQ and MAC Ltd. have jointly developed a cognitive radio demonstrator that allows single and multiple CR networks to be deployed alongside existing legacy (or licensed) users. The demonstrator not only provides a suitable platform to assess the impact upon legacy users, but also allows the behaviour of a CR network in a dynamic radio environment to be evaluated.

Virginia Tech & CTVR This demonstration shows the use of a cognitive engine to control a small network of inhomogeneous software-defined radios to enable waveform and spectrum reconfiguration. The demonstrations are designed to highlight the use of a cognitive radio for interoperability between different radios and standards, specifically CTVR's Plastic Project test-beds. In addition, this demonstrations shows co-operability between cognitive radio nodes for resource optimization (i.e., spectrum and power), and to demonstrate the use of a verification engine to ensure regulatory compliance of a cognitive radio capable of generating arbitrary waveforms.

Centre for Telecommunications Value-Chain Research (CTVR) at Trinity College Dublin & Virginia Tech CTVR demonstrate signal detection, classification and frequency rendezvous using embedded cyclostationary signatures for OFDM-based networks. The demonstrations use the CTVR Plastic Project platform for cognitive network experimentation and illustrate the use of cyclostationary signatures to facilitate distributed coordination in cognitive networks. In addition, CTVR demonstrate coexistence with primary users in shared spectrum segments and interoperability with a cognitive radio independently developed by CWT, Virginia Tech.

University of South Florida The purpose of the demonstration is the detection and identification of wireless communication signals of any kind over a wide frequency span, which includes signals of current wireless technologies and also the signals that are occupying the DySPAN 2007 licenced trial and licence-exempt channels. The spectrum analyzer (MT8220A by Anritsu Corporation) detects and captures RF signals which are then identified and classified in terms of multiple access method, carrier information, bandwidth, center frequency and power level.

University of Kansas The University of Kansas is demonstrating a portable, powerful, and flexible software-defined radio development platform called the Kansas University Agile Radio (KUAR). The primary purpose of the KUAR is to enable advanced research in the areas of wireless radio networks, dynamic spectrum access, and cognitive radios. Operating in the 5-5.8 GHz band, the KUAR demonstration highlights the modular and reconfigurable components of the radio with respect to both hardware and software.

Knowledge and Data Engineering Group, CTVR, Trinity College Dublin As part of its research within CTVR, the KDEG group at Trinity College Dublin demonstrate a specific extension to the DARPA XG policy language (XGPL) based on abstractions from a scheme called community-based policy management (CBPM). The benefits of this integration are illustrated through a case study based on the potential use of the dynamic spectrum access trial license granted in Ireland for DySPAN 2007, and the organizational conflicts that even this straightforward scenario can yield.

National University of Ireland, Maynooth NUIM demonstrate the features and capabilities of a reconfigurable radio platform currently under development in the Institute of Microelectronic and Wireless Systems (IMWS), Maynooth. This platform is designed to operate in a frequency band from 1.6 GHz to 2.5 GHz and support the GSM1800, DCS1800, PCS 1900, UMTS-FDD, UMTS-TDD and 802.11b standards.

1.4 Contact Information

Keith Nolan (CTVR at Trinity College Dublin)
Todd Martin (Science and Technology Associates Inc.)
IEEE DySPAN 2007 Demonstrations and Poster Chairs
DySPANdemos@comsoc.org
www.ieee-dyspan.org
Keith Nolan : +353 1–896–8443
Todd Martin : +1 703–522–5123

Anritsu (www.anritsu.com)
Centre for Telecommunications Value-Chain Research (CTVR) (www.ctvr.ie)