# IEEE DySPAN 2008 Demonstration Track
# Call for Proposals

## Introduction

IEEE DySPAN 2008 will provide the opportunity to conduct live demonstrations of dynamic spectrum systems and networks. This year's event will build on the huge success of the demonstrations at IEEE DySPAN 2007 by offering an invaluable opportunity to **demonstrate, experiment, and interact** with other world-leading researchers. This is a call for proposals to demonstrate systems, prototypes, and critical technology components and algorithms at IEEE DySPAN 2008.

IEEE DySPAN 2008 will be held in the Millennium Knickerbocker Hotel, Chicago, IL from Oct. 14 – 17th 2008. Further information regarding the symposium is available at http://www.ieee-dyspan.org/2008/

In addition to pre-planned demonstrations, unique opportunities may exist for experimentation by participants. Such opportunities include general measurements of spectral activity during the demonstration and experimentation sessions; the interaction of various, independently-developed systems and networks; and the coexistence of systems using different spectrum adaptation algorithms.

To participate in the demonstration and experimentation activities, candidates must complete the attached form to provide a description of the proposed demonstration and/or experimentation. The proposals will be evaluated by the DySPAN demonstration committee based on the following criteria:

- **Technical Significance**: the extent to which the demonstration illustrates advances in dynamic spectrum access technologies.

- **Demonstration Maturity**: the demonstration must be mature enough "to leave the lab." Demonstrations involving RF transmissions must include *a priori* or *in situ* risk mitigation measures to ensure regulatory compliance and coexistence with other spectrum users.

- **Demonstration Supportability**: the demonstration must be performed within the capabilities and resources of the DySPAN symposium. Demonstration systems should ideally coexist with other potential demonstrations on a coordinated or uncoordinated basis.

The selected demonstrations will undergo a final review approximately 45 days prior to the symposium to ensure their operational readiness.

Accepted proposals are encouraged to submit a two to four page demonstration description to be included in the DySPAN 2008 proceedings.

## Important Dates

| | |
|---|---|
| February 29, 2008 | Complete attached proposal form and submit to dyspandemos@ctvr.ie |
| April 1, 2008 | Notification of demonstration proposal acceptance |
| September 1, 2008 | Submission deadline for demonstration paper |
| October 14-17, 2008 | DySPAN symposium |

## Regulations and transportation

Regulatory licenses will be negotiated and procured by the demonstration committee based on submitted system capabilities. It is therefore necessary to have knowledge of all possible frequency ranges a device is capable of using if certain frequencies are restricted for experimental use in Chicago.

It is the responsibility of each demonstration participant to secure shipping and handling of their equipment to and from the demonstration site. Those companies/research institutions that will ship equipment from outside of the US may wish to arrange a Carnet. The Carnet is a type of "Merchandise Passport" that can be used as proof that you are temporarily importing commercial samples or professional equipment for exhibition in the host country. US Customs and Border Security is part of the Carnet program as are many other countries. Demonstrators from countries that do not participate in this program will need to contact their local customs officials to facilitate transportation. A suitable link to learn more about Carnets is: http://www.uscib.org/index.asp?documentID=718

Other points of note:

- Moving large amounts of electronics through an airport (especially customs) is going to take time. Consider using airfreight for transferring equipment. Otherwise, prepare well in advance and be sure to have all supporting documentation on hand.
- It is also advised that participants consider insurance for any hardware during the symposium and shipping process.
- To obtain a shipping address for the symposium, send a request to dyspandemos@ctvr.ie

## Contact Information

Tom Rondeau and Keith Nolan

Email: dyspandemos@ctvr.ie
Phone: +353 1-8968443

www.ieee-dyspan.org/2008/

# DySPAN 2008 Demonstration Proposal

Complete the following form with as much detail as possible. This information will be used to evaluate suitability of admission into the DySPAN Demonstration Session based on the technical significance to the symposium, demonstration maturity, and demonstration supportability.

## Contact Information


| | |
|---|---|
| Primary Contact Name | **Randy Ekl** |
| Organization | **Motorola, Inc.** |
| Address | **1301 E. Algonquin Rd.**<br><br>**Schaumburg, IL 60196** |
| Phone Number | **847-576-8359** |
| Email Address | **Randy.Ekl@Motorola.com** |


## Abstract

Provide a concise (300 words) summary of the proposed demonstration and its technical significance.


**This demonstration will show a Cognitive Radio system operating over the air in the UHF band. It will show broadband communications between multiple nodes using an 802.11a protocol rebanded to the TVWS frequencies (470-698 MHz). A cognitive engine will use Geolocation calculations based on the FCC Consolidated Database system (TV transmitter database) to ensure incumbent DTV channels are avoided. Further, Distributed Sensing functionality will report sensing results from client nodes back to a centralized master node. At the master node, cognitive engine functionality will use the geolocation results as the primary driver, augmented by the sensing results, to determine operational parameters of the system (power, channel, etc.). An interferer will be introduced near the various non-co-located nodes to demonstrate distributed sensing.**

# Description

The description should include sufficient detail such that the evaluators can understand the purpose, configuration, design, and conduct of the demonstration/experiment.

## Primary technical goals

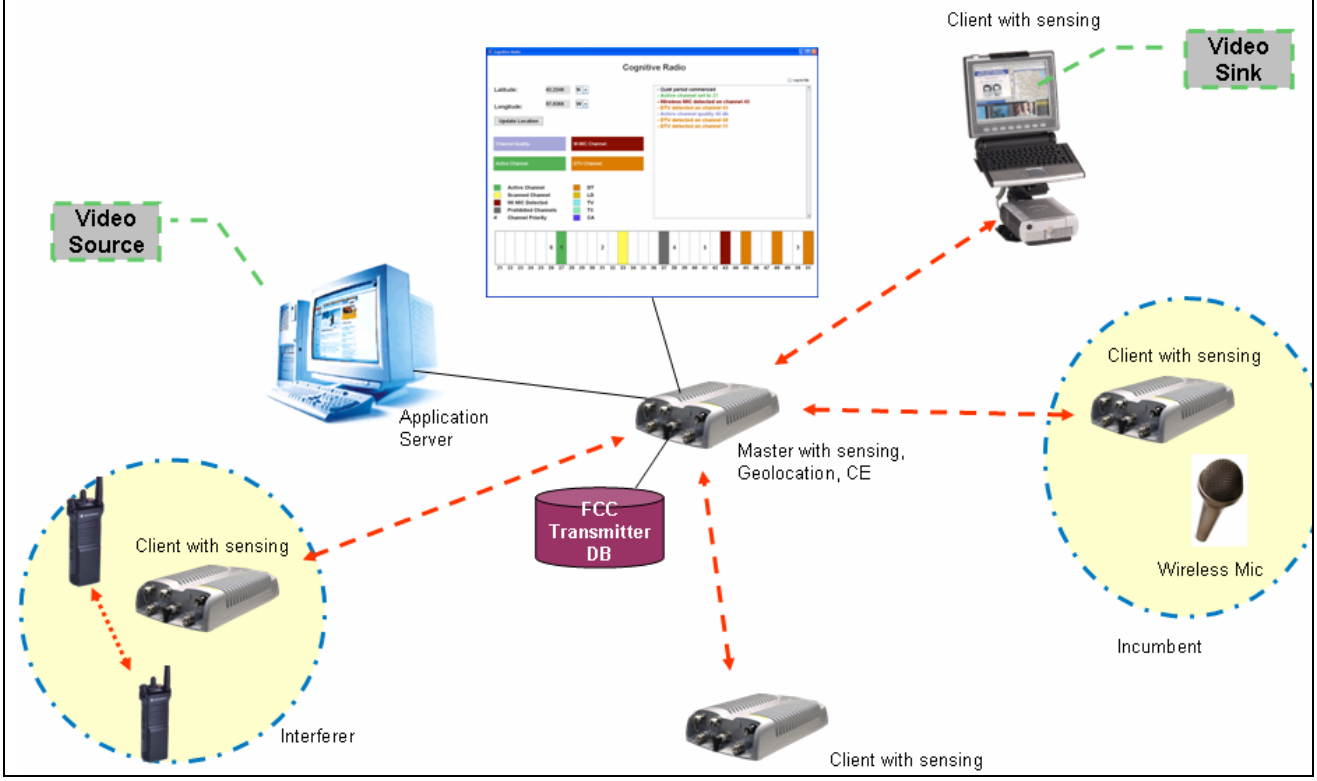
**Demonstrate Geolocation functionality.**
**Demonstrate Distributed Sensing functionality.**
**Demonstrate operation in TVWS UHF spectrum (470-698 MHz).**
**Demonstrate avoidance of incumbent (e.g. DTV) users.**

## Description

Pictures, screen shots, and system drawings are encouraged (attach as necessary)

**Master node (AP) with Geolocation functionality, sensing, and a cognitive engine.**
**Multiple client nodes, each with sensing.**
**Each node will have an associated computer (laptop) with web browsing and/or video capability.**
**The master node will have a connection to the internet.**
**Operation and avoidance of an interferer will be shown.**

**Note: system diagram is representative – details are subject to change.**



| Operational parameters | |
|---|---|
| Frequency Ranges | **470 – 698 MHz** |
| Bandwidth | **6 MHz channels** |
| Peak Input Power to Antenna | **27dBm** |
| Antenna polarization and gain | **Vertical polarization, wideband stick antenna: gain 1dB** |
| Waveforms (modulation type) | **OFDM (802.11a)** |

## Technical Significance

Address the technical significance of the demonstration/experiment.

### Description of the technologies

**GeoLocation technology** – access FCC Consolidated Database system and current location; determine incumbent DTV channels to avoid; determine baseline operational parameters for system (power, channel, etc.).

**Distributed Sensing** – sense channels at multiple locations; report information back to master node. Demonstrate performance gain (detection probability, detection time, etc) realized from distributed sensing.

**Cognition Engine** – algorithms to aggregate geolocation information as well as sensing information to update and finalize operational parameters.

**802.11a** – PHY/MAC protocol for local area operation.

**TVWS / UHF** – 470-698 MHz operation

### A discussion of the perceived impact of the demonstration to dynamic spectrum in general and the DySPAN audience in particular

**This demonstration shows the feasibility of a multi-node, end-to-end, over-the-air system utilizing dynamic spectrum access through the application of multiple cognitive radio technologies (geolocation, distributed and localized sensing, cognitive engine), successfully avoiding incumbent users and other interferers.**

## Technical Maturity and Operational Capabilities

Provide sufficient detail regarding the maturity of the demonstration/experimentation.

### Current state of the technology, hardware, and software

**We are using a 3rd party hardware plus internally developed prototype hardware. The hardware is mature - we have been using it for the past approximately 18 months.**

**We are using 3rd party applications plus internally developed prototype software / technology, specifically the Geolocation algorithms, Cognitive Engine (algorithms), and Distributed Sensing mechanisms. The applications, geolocation, cognitive engine and centralized sensing algorithms are mature; they were demonstrated to the FCC in August, 2007, and are being used in the current FCC White Space Device (WSD) testing.**

**We have defined and simulated the algorithms for the distributed sensing and cognitive engine changes required. The software development of these remaining items has started.**

### Amount and type of work yet to be done prior to DySPAN

**Implementation of Distributed Sensing Algorithms.**
**Integration and Testing.**

### Risk mitigation methods to be implemented to ensure proper operation within regulatory constraints

**Risk Mitigation for the demo: If Distributed Sensing functionality does not work in time, then the demonstration will consist of the other components of the system (Geolocation, Cognition, Centralized Sensing, TVWS/UHF, 802.11a), which are all currently working.**

**Risk Mitigation to ensure operation within regulatory constraints – Geolocation as the primary mechanism, augmented by sensing, to avoid incumbents.**

Previous experience and trials of demonstration equipment's coexistence with other communication systems

Note that a summary of existing test results may be useful in conveying the operational readiness and stability of the demonstration/experiment

**Over the air demonstration to the FCC in Washington, DC, in Summer, 2007, showing avoidance of DTV channels via Geolocation and Sensing, including showing video between two nodes using rebanded 802.11a.**

## Logistical Needs

Include the logistical needs for supporting the demonstration/experiment at DySPAN. These details allow the planners to properly acquire and allocate resources to support the demonstrations.

| | |
|---|---|
| Amount of space required (sq. ft or sq. m) | **60 sq ft for per radio x 4 radios spaced in 100m radius** |
| Number of demonstration tables required | **2 tables for centralized setup, plus 3 times 1 table for each remote setup.** |
| Input power requirements and number of outlets (note: US uses 120V, 60 Hz power with a NEMA 5 (flat 3-prong) plug) | **6 outlets, 20amp circuit per setup** |
| Approximate power consumption | **1200 Watts per setup** |
| Storage and security requirements for equipment | **8 ft x 8 ft area in a secured room** |
| Instrumentation and other support equipment requested of DySPAN | **None** |
| Internet/network access (wireless, wired, number of ports, etc.) | **Internet access at centralized setup** |
| Other needs | **Easels for displaying posters, Location next to Motorola Policy demonstration** |

## Checklist

[ X ] Contact information is complete and accurate
[ X ] Abstract
[ X ] Description is complete, including all operation parameters requested
[ X ] Technical specification
[ X ] Technical maturity and operational capabilities
[ X ] Logistical needs described as fully as possible

[ X ] We grant permission to make the information in this proposal public.