

**NARRATIVE DESCRIPTION OF REQUEST FOR EXPERIMENTAL
AUTHORIZATION**

By this application, National Public Radio, Inc. (“NPR”) respectfully requests an experimental license pursuant to Sections 5.3(d), 5.3 (i) and 5.53 of the Commission’s rules, 47 C.F.R. §§ 5.3(d), 5.3(i) and 5.53, to conduct tests needed to evaluate the feasibility of using a “Cognitive Modulator” (“CM”) operating below the current FM band as an alternative to the current use of FM modulators. NPR is planning to involve several other participants (e.g., CM service providers, CEA, CM manufacturers, etc) in the program and already has the active participation of Audiovox and Sirius XM Radio.

Background

FM Modulators have been used for decades to allow audio content from external devices to access automobile radios so that vehicle occupants can hear the content through the vehicle’s FM radio, when tuned to a locally unused broadcast channel. A wide range of devices have used FM modulators, including cellular telephones (for hands free operation), music recorders, navigation devices, HD radios, satellite radio receivers, DVD players, CD players, iPods, and iPads.

However, FM modulators have traditionally presented numerous problems for consumers.¹ First, FM modulators have the potential to cause interference to FM band listeners. Second, their operation is often limited by the need to transmit at low power levels under the Commission’s rules. Third, as automobiles travel between geographic regions, FM modulator users need to retune their car radios and modulators to find unused FM frequencies en route.

Fourth, and perhaps most significantly, FM modulators must function at a very low power in a challenging interference environment -- created by frequency usage in the FM band itself -- where few FM broadcast channels are vacant in the automobile’s travelled geographic region. Interference limiting the operation of FM modulators has been greatly exacerbated by the introduction three years ago of In Band On Channel (IBOC) transmission in the FM broadcast band. Interference to FM modulators will be further increased by the Commission’s decision allowing IBOC transmitters to increase ERP by 6-10 dB.² The nature of IBOC interference is very confusing to consumers attempting to tune a modulator to an “open” FM frequency, as a frequency with IBOC interference has no audible content and appears to be unused. The higher sideband power of digital IBOC transmissions also impacts the operations of FM modulators.

¹ Some of the limitations of using FM modulators are identified in an independent consultant’s recent review of a Belkin after-market FM modulator. See Radio World, The Belkin TuneCast Auto Live (July 27, 2010), <http://www.rwonline.com/article/104022> (last visited October 26, 2010).

² See Digital Audio Broadcasting Systems And Their Impact on the Terrestrial Radio Broadcast Service, 25 FCC Rcd 1182 (Media Bur. 2010).

Proposed Experimental Program

Preliminary testing organized through NPR suggests that a Cognitive Modulator operating at 87.7 MHz may present a solution to the above service problems. A CM would sense the amount of interference and noise (I+N) at or around 87.7 MHz and adjust its transmitter output power to provide a desired C/(I+N) at 87.7 MHz into an automobile's FM radio using a modulated bandwidth no greater than 200 kHz. In this application, NPR requests the authority to conduct further testing through an experimental license to provide further evidence as to the viability of this concept.

The proposed experimental program is in two parts as described below.

1. *Determination of CM parameter values and operation:* This aspect of the program would determine maximum and minimum CM transmitter power, (I+N) sampling slots and times, required C/(I+N), optimum modulation parameter values, receive/transmit antenna configurations, and transmitter power level response time changes. It will be necessary to perform these measurements in field environments representative of the proposed application, since (I+N) is a function of many variables including propagation.

2. *Determination of CM interference:* These measurements would determine whether CM will create interference to broadcast television Channel 6 viewers, FM broadcast band receivers, other CMs in adjacent vehicles, or wireless microphones operating in the channel 6 white space.

Experimental Operation

The experiments will be performed around the New Haven and Hartford, Connecticut, which represent a high and low (I+N) respectively.³ Experiments to determine the C/(I+N) sampling and power control will be conducted primarily from an instrumented vehicle driving urban and suburban streets and road. Interference measurements to digital TV Channel 6 reception will be conducted from stationary DTV receivers located near the roadways as well as inside nearby buildings. Interference tests to FM broadcast receivers operating on 88.1 MHz will be conducted by comparing maximum radiated fields to the interference rejection characteristics of receivers at 350 kHz frequency separation.

³ WEDY(TV), channel 6 (Facility ID No. 13595), is a full-service DTV station licensed to New Haven, CT. It is expected that the VSB transmission from this station will provide a signal for interference to the FM modulator as well as a broadcast TV signal for verification of interference-free DTV reception in the vicinity of the CM device.

Antenna Information

The CM will operate using two antenna systems, one for RF environment probing and one for radiating or injecting the modulated FM into the vehicle's FM receiver system.

The RF probing antenna will be a linearly polarized wire or loop, from 0.05λ to 0.25λ in electrical length at 87.7 MHz. The RF probing antenna will be buffered and physically isolated from the CF transmission signal to inhibit inadvertent signal responses.

In the case of the CM's radiating or injecting antenna system, the radiating element shall be a simple, linearly polarized wire or loop electrically equal to or less than 0.25λ at 87.7 MHz. Regardless of size, gain, directivity, and method of injection coupling to the vehicle FM receiver system, the field strength of the signal radiated at 87.7 MHz shall be limited to that allowed by the Experimental License.

RF Exposure. NPR will conduct its experimental operations in compliance with the Commission's rules and regulations governing human exposure to radiofrequency radiation.

Operational Safeguards

NPR recognizes that the proposed testing must not cause harmful interference to authorized broadcast facilities or operations. NPR does not anticipate that such interference will occur, given the low field strength of the CM transmission in comparison with the potentially interfered with signal, coupled with the distance of the CM from co-channel receivers. However, NPR will provide prior notice to representatives of WEDY of any actual testing and promptly address any instances of interference in the unlikely event such interference should occur, including if necessary by terminating test emissions.

On November 18, 2001, engineers from NPR and Sirius XM met with engineering representatives of WEDY to explain the CM operation and test procedures. WEDY's representatives accepted an offer to review the experimental test plan before the proposed field trials are conducted, and are invited to observe any of the testing. WEDY's management has reviewed this Narrative Description of Request for Experimental Authorization and has expressed its willingness to cooperate with the proposed testing.