

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
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Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies)	ET Docket No. 03-108
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Authorization and Use of Software Defined Radios)	ET Docket No. 00-47 (Terminated)
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Comments of the Industrial Telecommunications Association, Inc.

The Industrial Telecommunications Association, Inc. (ITA) hereby respectfully submits its comments in response to the Commission’s *Notice of Proposed Rulemaking and Order* (NPRM) in the above-referenced matter.¹ The NPRM seeks comment on applications and proposals for the use and regulation of cognitive radio technologies. As discussed in more detail below, ITA believes that land mobile licensees’ need for reliable, secure, uninterrupted and timely access to spectrum for mission-critical applications outweigh the development of a premature cognitive radio technology as a spectrum management tool in safety-of-life radio services.

I. Statement of Interest

ITA is a Commission-certified frequency advisory committee coordinating in excess of 13,000 applications per year on behalf of applicants seeking Commission authority to operate on a wide-variety of frequency assignments allocated between 30-900 MHz.

¹ See, Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies and Authorization and Use of Software Defined Radios, *Notice of Proposed Rulemaking and Order*, ET Docket No. 03-108, ET Docket No. 00-47 (Terminated), (rel. Dec. 30, 2003) (NPRM).

ITA enjoys the support of a membership including more than 2,100 licensed two-way land mobile radio communications users, private mobile radio service (PMRS) oriented radio dealer organizations, and the following trade associations:

Alliance of Motion Picture and Television Producers
Aeronautical Radio, Inc.
National Propane Gas Association

In addition, ITA is affiliated with the following independent market councils: the Council of Independent Communications Suppliers (CICS), the Taxicab & Livery Communications Council (TLCC), the Telephone Maintenance Frequency Advisory Committee (TELFAC), and USMSS, Inc.

ITA's extensive involvement with the private land mobile industry expands into many services including: application preparation for public safety and first responders; coordination and engineering services for industrial/business users, commercial licensees under Part 90 of the Commission's rules, and PMRS radio dealers; protection of petroleum service users through a contractual agreement with the American Petroleum Institute; an industry liaison for equipment manufacturers and end users, as well as band managers and end users; the Commission's first line of post-licensing, interference resolution; and various other services.

II. Background

On March 21, 2000, the Commission released its *Notice of Inquiry* requesting information on software-defined radios.² ITA became party to this proceeding by filing comments and reply comments, emphasizing that the technologies used for software-defined radios are still being developed and that it would be premature to devise regulations governing

² See, Inquiry Regarding Software Defined Radios, *Notice of Inquiry*, ET Docket No. 00-47, (rel. March 21, 2000).

such operations.³ Then, on September 14, 2001, the Commission released its *First Report and Order*, creating a new class of rules for software-defined radios.⁴ On December 30, 2003, the Commission released the instant NPRM soliciting comments on applications that use cognitive radio technologies in a number of applications. Furthermore, the Commission sought comment on specific proposals for applying these technologies as a spectrum management tool, to existing services, including the context of spectrum leasing in public safety and other land mobile radio services.⁵

III. Discussion

ITA generally supports possibilities for increased spectrum access through new and advancing technologies. However, ITA urges the Commission to proceed cautiously when implementing emerging technologies in radio services used for mission-critical and safety-of-life operations. In this case, the benefits of increased spectrum access do not outweigh the public interest standard of preventing harmful interference, or delayed transmissions, of mission-critical communications. Further research and studies on the instant proposals such as the use of “beacons” as a means of managing spectrum access, should be performed in controlled operating environments.⁶

³ See, Inquiry Regarding Software Defined Radios, *Comments of the Industrial Telecommunications Association, Inc.*, ET Docket No. 00-47, (filed June 14, 2000). See also, Authorization and Use of Software Defined Radios, *Reply Comments of the Industrial Telecommunications Association, Inc.*, ET Docket. No 00-47, (filed May 18, 2001).

⁴ See, Authorization and Use of Software Defined Radios, *First Report and Order*, ET Docket No. 00-47, (rel. Dec. 30, 2003).

⁵ See generally, NPRM.

⁶ NPRM at ¶ 57. “In a beacon system, the transmitter must have the ability to receive a control signal sent continuously by the licensee at times when transmissions by the lessee are permitted.”

A. Public Safety and Private Wireless Systems Support Safety of Life Applications that Cannot be Compromised Under the Guise of Technological Progress

Cognitive radio technologies, while promising to maximize spectral efficiency in the future, are only in their infantile stages of development and ITA believes it would be premature of the Commission to accept operation of these technologies on safety-of-life spectrum. ITA understands that the Commission is enthusiastic about facilitating the introduction of new technologies into the marketplace, as is ITA, nevertheless, incumbent operations should not be put at risk of harmful interference for the introduction of a new technology.

1. Public Safety and Private Wireless Systems Require Reliable, Secure and Timely Communications that Must Not be Endangered by Easily Manipulated Radio Equipment

Many operations in the land mobile radio bands, particularly public safety systems, are used for safety-of-life applications that demand reliable, real-time access to spectrum. In addition to traditional public safety operations, private land mobile users share spectral and geographic environments with public safety users and deploy relatively similar communications systems for mission-critical communications. These systems support all facets of transportation, pipelines and construction operations, among many others, all of which support the safety of employees and the public at-large for every American business and industry sector. Noting the importance of these communications for the safety-of-life and the prevention of property damage, these communication systems must not be put at risk of system degradation, simply for the development of emerging technologies, such as cognitive radios. Land mobile licensees in many instances are required to access their communications system instantaneously. Any delay, even if just for one or two seconds, waiting for a cognitive radio to vacate a requested channel, has the potential to be fatal.⁷

⁷ For example, private wireless systems are used by crane operators at shipping ports to

2. The Commission Must Remain Cognizant of the Heightened Potential for Rogue Operations with Easily Manipulated Radio Equipment

Cognitive radio concerns stem from its innovative opportunities. While this technology provides for frequency agility, adaptive modulation and transmit power control, ITA and the Commission must remain cognizant of the potential for the device operator to alter the equipment so as to effectively modify the operating parameters of the device and the surrounding spectral environment for incumbent users. Simply stated, these advanced technologies could be used to circumvent the Commission's rules or avoid them altogether to the degradation of the signal of incumbent licensees.

As the Commission states in its NPRM, there are many aftermarket adjustments that cognitive radio users could perform to change their operating parameters.⁸ These alterations could cause a change to the device's operating environment and that of incumbent licensees, thus leading to system degradation or harmful interference to other users, whether licensed and/or unlicensed. Especially given the Commission's suggestion of peer enforcement,⁹ ITA remains concerned that the process of pinpointing and alleviating interference from a cognitive radio operator may be difficult, if not impossible, when the interfering signal emitted comes from a device with illegal adjustments.

Once new devices, such as cognitive radios are authorized for use, addressing harmful interference or service disruptions reactively can be much more difficult than a proactive approach. Unfortunately, the Commission and public safety licensees are all too familiar with the difficulties in addressing widespread interference in a reactive manner. One example of this

communicate with individuals on the dock and on ships while moving large crates. In instances such as these, a delay in communications could have a disastrous effect. Similarly, and arguably more important, police officers depend on instantaneous communications for their personal safety as well as the safety of the public.

⁸ NPRM at ¶ 30.

⁹ NPRM at ¶ 30.

frustration stems from their collective efforts to address public safety interference issues in the 800 MHz band under the auspices of the “Best Practices” guide.¹⁰ As a consequence, ITA advocates enhancing the Commission’s enforcement capabilities to prevent non-compliant use of cognitive radios, should the Commission proceed with authorization of cognitive radio use in land mobile radio bands. Peer enforcement simply would not be adequate for addressing issues of harmful interference and rogue operation near the spectral or geographic vicinity of safety-of-life operations. Thus, ITA believes enforcement of cognitive radio operations must be conducted by the Commission.

B. The Commission Must Perform Research and Sufficient Tests on the Use and Applications of Cognitive Radio Technologies Before Authorizing the Operation of These Types of Devices in Land Mobile Radio Services

ITA cannot support the premature deployment of cognitive radio technologies in land mobile radio services on safety-of-life channels without adequate testing in controlled operating environments and further advancement of the technology. As apparent as the many computer viruses that attack personal and business computers each day, those performing rogue operations are continually creating new means of by-passing security developments. The same daily problems could ring true with cognitive radio. ITA, therefore, urges the Commission to remain aware of the real possibility that rogue operations with these types of devices would severely damage land mobile radio systems and the people protected by them. ITA suggests that extensive testing be completed to demonstrate that incumbent licensees will continue to enjoy reliable, secure, timely and otherwise uninterrupted and non-interfering communications, if cognitive radio technologies are authorized for use in any spectrum allocation. Without the

¹⁰ *See generally*, In the Matter of Improving Public Safety Communications in the 800 MHz Band and Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels, *Notice of Proposed Rulemaking*, WT Docket. No 02-55, (rel. March 15, 2002).

necessary safeguards in place through sufficient testing, prior to implementation, the possibility of pervasive harmful interference and unauthorized use could become reality.

C. Interruptible Leasing Through "Beacon" Control, While Attractive, Lacks a Guarantee or Unequivocal Assurance that Radios Will be Available and Operable for a Public Safety or Mission-critical Licensee in a Timely Manner During an Emergency

One proposal for implementing spectrum leasing through the use of cognitive radios involves the use of a "beacon." Similar to a control channel, a "beacon" would send a signal to the lessee's device to allow it to operate; if the beacon ceases, in theory so would the lessee's transmissions.¹¹ ITA, representing a membership of shared spectrum users, understands the Commission's intention to implement new means of increasing spectrum access, but cannot at this time support the use of "beacon" controlled leases on spectrum used for public safety and mission-critical operations. As noted above, many land mobile licensees' systems are used for communications that cannot be put at risk, by easily altered equipment. Many times the safety of the public is of concern and access to spectrum is of the utmost importance. In the case of a major emergency or disaster, the increase in spectrum use would occur dramatically and immediately. During instances such as these, incumbent licensees must be assured of no delays in transmissions because a "beacon" signal is not accessible.

D. When Evaluating Efficient Use of Spectrum, the Commission Should Consider the Necessary Spectral, Geographic and Temporal Excess Capacity that Must Be Built-in for Effective Public Safety and Private Wireless Systems

Many of the radio services found in the land mobile radio bands are operating on shared spectrum in a spectrally efficient manner through the use of frequency coordination and engineering practices. These land mobile operations, including both private and public users, at certain times have excess capacity. This excess capacity is required and intentionally built into

¹¹ NPRM at ¶ 56.

these systems, so that in times of high usage there are no problems with transmitting or receiving information. Surely, most people with mobile telephones have heard the recording, “all circuits are busy, please try your call again.” Instances such as these, are completely unacceptable for private wireless users; hence the need for a private, internal communications system. Changes in system access can transpire very rapidly and at intermittent times, locations and durations, depending on the application and the specific situation. A private system must have the capacity to manage those instances of high use.

Much of the spectral efficiency focus at the Commission revolves around the amount of users on a limited number of channels at any given time, which can be a sound efficiency indicator for certain services, such as cellular or PCS, but does not accurately represent the needs and requirements of a majority of land mobile radio systems. Public safety and private wireless licensees would not consider it efficient to “pack” the spectrum with subscribers or users, as these licensees need a sufficient signal for reliable communications and excess capacity in emergency situations, which is the primary reason for governments and businesses to own a private system. Excess capacity should, therefore, be considered efficient when considering the use value of public safety and private wireless spectrum.

IV. Conclusion

ITA appreciates the Commission’s effort to increase spectral efficiency through the promotion of new technologies; however, it is premature at this time to authorize the use of cognitive radio technology, especially in or around safety-of-life services. Due to the critical nature of many of private wireless and public safety systems, these entities expect reliable, secure, and timely communications, and cannot accept harmful interference or delays in transmissions from cognitive radio users that share the spectral or geographic environment.

Logic leads us to believe that easily manipulated technology, whether legally permissible or not, will be altered by some seeking to advance their own personal gain. Such potential for rouge operation should not be permitted on mission-critical or safety-of life channels. Moreover, ITA suggests that the Commission further research the development of cognitive radios before allowing the deployment of this new technology.

Respectfully submitted,

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