

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

In the Matter of)
)
Additional Spectrum for Unlicensed) ET Docket No. 02-380
Below 900 MHz and in the 3 GHz Band)
)
To: The Commission)
In the Matter of)

MOTION TO ACCEPT LATE-FILED COMMENTS

On behalf of the IEEE 802.18 Radio Regulatory Technical Advisory Group, and the IEEE 802.11, 802.15, and 802.16 Working Groups, I respectfully request that the Commission accept and consider the attached late-filed *Reply Comments of IEEE 802.18 in ET Docket No. 02-380*.

While we understand that the stated filing deadline for comments in this Proceeding was May 16, 2003, we were unable to meet that deadline for the following reasons:

1. IEEE 802.18 and the wireless Working Groups held their most recent interim meeting May 12th through 16th, 2003 in Dallas, TX.
2. Under IEEE 802's operating rules, which are designed to assure that documents such as the attached reply comments represent the consensus views of a significant majority of our members, after a document such as this is prepared it must be approved and then be reviewed by the IEEE 802 Sponsor Executive Committee ("SEC") before it can be filed with a regulatory agency.
3. The attached document was drafted by a committee of designated experts during the interim meeting week, but could only be approved by the Working Groups during their closing plenary sessions at the end of the meeting week (the filing deadline date) and then submitted to the SEC for the review prior to filing.
4. The review period required by our operating rules ended at 12:00 noon EDT today, May 23, 2003.

Therefore, I again respectfully request that the Commission accept and consider the attached
Reply Comments of IEEE 802.18 in ET Docket No. 02-380.

Respectfully submitted,

/s/

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Below 900 MHz and in the 3 GHz Band)
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To: The Commission)

REPLY COMMENTS OF IEEE 802.18 IN ET DOCKET NO. 02-380

IEEE 802.18, the Radio Regulatory Technical Advisory Group (“RR-TAG”) within IEEE 802¹ hereby respectfully offers our Reply Comments in the above-captioned Proceeding.²

The members of the RR-TAG that participate in the IEEE 802 standards process are interested parties in this proceeding. IEEE 802, as a leading consensus-based industry standards body, produces IEEE 802 standards³ for wireless networking devices, including wireless local area networks (“WLANs”), wireless personal area networks (“WPANs”), and wireless metropolitan area networks (“Wireless MANs”), all of which require spectrum resources in order to provide the public with the benefits of wireless networking.

This document was also reviewed and approved by the 802.11, 802.15, and 802.16 wireless working groups.

The 802.18 RR-TAG appreciates the opportunity to provide these Reply Comments to the Commission.

¹ The IEEE Local and Metropolitan Area Networks Standards Committee (“IEEE 802” or the “LMSC”)

² This document represents the views of the IEEE 802.18 RR-TAG and the working groups listed above. It does not necessarily represent the views of the IEEE as a whole or the IEEE Standards Association as a whole.

³ Millions of devices based on IEEE 802 Standards currently operate in unlicensed Part 15 spectrum. More spectrum will be required to meet future needs for unlicensed devices and we commend the Commission for undertaking this Notice of Inquiry.

INTRODUCTION

1. In reviewing the body of comment submitted to date in this Proceeding relating to the potential for unlicensed use of unused channels in the TV broadcast bands, we believe that the major points of all comments on that topic can be summarized as follows:

- Public safety users must be adequately protected from harmful interference from unlicensed devices.
- TV reception must be adequately protected from harmful interference from unlicensed devices.
- Radio astronomy must be adequately protected from harmful interference from unlicensed devices.
- Harmful interference to channel 2, 3, & 4 devices must be avoided, specifically with respect to the operation of VCR's, DVD players and other widely used consumer electronics equipment which may use these channels as part of their operation.
- Some commenters assert that devices that implement active channel avoidance techniques cannot be effective in preventing interference in a shared use scenario, or that the incorporation of effective interference avoidance techniques into unlicensed devices would be inherently cost-prohibitive.
- The Consumer Electronics Association asserts that broadcasters and TV manufacturers are the primary sources of expertise regarding operation in the TV bands and must be given a predominate position in establishing sharing rules.

2. We will address these issues in more detail below in the section entitled "Unlicensed Use of Unused TV Spectrum".

3. With regard to the possible allocation of the band 3650-3700 MHz for use by unlicensed devices, we note the concerns regarding the potential for interference to C-band satellite earth stations expressed by satellite interests, and will also address those issues in more detail below in the section entitled "Unlicensed Operation in the 3650-3700 MHz Band."

4. Finally, we will address the legal questions raised by Cingular Wireless LLC regarding the Commission's authority to authorize unlicensed operation in either the TV broadcast bands or the 3650-3700 MHz band below in the section entitled "Addressing the Legal Issues Raised by Cingular Wireless LLC."

UNLICENSED USE OF UNUSED TV SPECTRUM

FCC Rules for Unlicensed Use of the TV Bands Can, and Should, Be Crafted to Allow Unlicensed Use While Insuring Sufficient Protection from Harmful Interference to Public Safety, TV Broadcast Reception, Radio Astronomy, and Other Consumer TV Devices

5. We believe that robust technologies exist, and additional technologies are both technically and economically feasible, to allow unlicensed use of the TV bands without causing harmful interference to incumbent uses, regardless of the incumbents' mode of operation.
6. For example, Task Group h within the IEEE 802.11 Wireless Local Area Network Working Group has created techniques, soon to be released as amendments to the IEEE 802.11 standard, that are specifically designed to avoid interfering with other spectrum users in shared bands, notably critical government radar systems in the 5 GHz band.
7. Specifically, we point to Dynamic Frequency Selection ("DFS") and Transmit Power Control ("TPC") technologies. The development of these technologies has become the basis for an agreement between industry and the spectrum management community in the US that is expected to expand unlicensed use of the 5 GHz band.
8. We specifically and emphatically reject comments by some contending that such technologies are either too costly to implement, ineffective, or outright infeasible.
9. A requirement for the incorporation of suitable interference avoidance technologies can be an integral part of any new Commission rules permitting shared use of the TV bands by unlicensed devices, insuring that channels already occupied continuously by TV broadcast channels, or intermittently by land mobile users, are free from harmful interference from unlicensed devices.

10. The Commission's equipment authorization process will effectively insure that all devices marketed meet such requirements.

11. Thus, we firmly believe that there is no need to deny the public the benefits of access to additional spectrum for unlicensed devices on the basis of vague and unproven assertions by incumbents that such use is impractical or would cause harmful interference to their operations.

12. We believe that the best use of the available spectrum is served by a minimum number of "keep out" channel designations. In the public safety arena, our contention is that very few channels in a geographic area are used so infrequently that appropriate "DFS" protocols and supporting circuitry would fail to detect their use. Nonetheless, if the Commission chooses, "keep out" channels could be designated by rule, and could be reliably enforced in software code within the unlicensed device.

13. We are aware that some devices subject to interference do not employ a transmit function, and so are not detectable by "DFS" techniques. We therefore make two recommendations for "keep out" channel designations:

- In agreement with the comments of the Consumer Electronics Association, we recommend that the Commission designate channels 2, 3, and 4 as "keep out" channels for unlicensed devices in any proposed rulemaking.
- In agreement with The National Academy of Sciences Committee On Radio Frequencies, we recommend that the Commission retain its current Part 15.205(a) limitations on the use of channel 37 (608-614 MHz).

**The Commission Should Continue to Seek Input From A Wide Range of Interested Parties
On Establishing Rules For Unlicensed Operation In The TV Bands**

14. We find the assertion by the Consumer Electronics Association (“CEA”) that broadcasters and TV manufacturers are the primary sources of expertise regarding operation in the TV bands and must be given the predominate position in establishing sharing rules to be questionable at best.⁴

15. The unlicensed device industry’s track record in working with regulators and other concerned parties in resolving the sharing issues in the 5 GHz band is evidence that appropriate expertise may be found beyond the confines of incumbent users of spectrum proposed for shared use by unlicensed devices – in this case beyond the confines of the broadcast industry.

16. We encourage the Commission to continue to seek input from *all* interested parties in pursuing unlicensed use of the TV bands. It is our belief that fresh perspectives brought to bear in developing a suitable regulatory environment for unlicensed use of the TV bands will result in regulations supporting both protection for incumbent users and flexibility for unlicensed operation.

17. While we are pleased to see the CEA recognize that “*Access to Unused Broadcast Spectrum on a Non-interference Basis Will Provide Needed Services to the Public,*”⁵ to give broadcasters and TV manufacturers any sort of special status in establishing sharing rules, as the CEA suggests,⁶ would be akin to placing the fox in charge of the henhouse, would be an abdication of the Commission’s regulatory and spectrum management responsibilities under the Communications Act, and would also, in our opinion, fly in the face of the open process required under the Administrative Procedures Act.

⁴ See, Comments of the Consumer Electronics Association, at the bottom of page 6.

⁵ *Id.*, near the top of page 7.

⁶ *Id.*, at the bottom of page 6.

**SPECIFIC RESPONSE TO THE “JOINT COMMENTS OF THE ASSOCIATION FOR
MAXIMUM SERVICE TELEVISION, INC., THE NATIONAL ASSOCIATION OF
BROADCASTERS, AND THE ASSOCIATION OF PUBLIC TELEVISION STATIONS”
 (“AMST, ET AL”)**

18. AMST, et al, assert that “*Unlicensed use of the television broadcast band poses significant risks to the integrity of over-the-air broadcasting*”⁷ and that “*Unlicensed devices are unlikely to include the technology necessary to avoid interference with broadcast operations.*”⁸

19. In an attempt to support these self-serving, unproven assertions, AMST, et al, cite what appears to be a commissioned “study” (“the Lipoff Report”)⁹, in an effort to “prove” their claims that it is “*economically impracticable to include such solutions [technology to detect, and avoid interference to, television broadcast operations] in the kind of mass market devices that have flourished in unlicensed spectrum.*”¹⁰

20. AMST, et al, and the author of the Lipoff report, either ignore, or are unaware of, the fact that the wildly successful devices built according to the IEEE 802.11b standard (also referred to as “Wi-Fi” devices) implement essentially the sort of “listen before talk” spectrum etiquette that Lipoff’s report seems to allege would unacceptably increase the cost of devices.

21. Additionally, as mentioned above, DFS and TPC are being implemented as an amendment to the IEEE 802.11 Standard, to prevent interference to incumbent users with which such license-exempt devices will share other bands (most notably to protect critical U.S. government radar systems in the 5 GHz band).

⁷ See Joint Comments of the Association for Maximum Service Television, Inc., the National Association of Broadcasters, and the Association of Public Television Stations, at Page 2, I.

⁸ *Id.*, at Page 3, A.

⁹ *Id.*, “Attachment A”

¹⁰ *Id.*, at Page 4, 1st para.

22. Since these sorts of unlicensed devices transmit data in packets of very short duration, *with protocol-enforced listen periods between transmissions*, rapid detection and avoidance of channel activity by incumbent users is entirely feasible, even while such unlicensed systems are actively transmitting data.

23. While we find that the Lipoff Report is fundamentally flawed in many of its basic assumptions too numerous to elaborate here, one its most glaring flaws is the assumption that an unlicensed device designed to share TV broadcast spectrum in a non-interfering way would require the incremental cost of an additional receiver, equivalent to a TV tuner, and associated “control and glue electronics,” above and beyond the receiver and control circuitry required for the unlicensed device itself.¹¹

24. Clearly, anyone intending to manufacture unlicensed devices intended to operate in unused TV broadcast spectrum would design their devices to be capable of covering the widest allowable range of TV channels, in order to maximize the possibility of identifying one or more unused TV channels in any given geographical area that might be used.

25. Since there is no logical or technical reason why the unlicensed device’s own receiver and control logic/firmware could not be designed from the start to perform the “clear channel” determination, there is no rational explanation for the Lipoff Report’s assertion that a separate, additional receiver and control system would be required at an incremental cost of \$100, and we find this “conclusion” and the assumptions behind it to be patently, ridiculously inaccurate.

26. Using such blatantly flawed assumptions as the basis for “analysis,” in our view, calls the validity of the entire Lipoff Report into question and furthermore raises the question of whether the entire report may have been intentionally crafted to arrive at predetermined conclusions.

¹¹ See, the text of the Lipoff Report, at section 5.2, page 16, and the accompanying Figure 5-3, page 17.

UNLICENSED OPERATION IN THE 3650-3700 MHz BAND

Addressing the Concerns of Satellite Interests

27. Opposition to unlicensed devices in the 3650-3700 MHz band from satellite interests appears to be primarily on the basis of concerns that unlicensed devices will interfere with satellite downlink operations, either as co-channel interference, adjacent channel interference, or “blocking” phenomena from out of band signals in close proximity to satellite earth station receivers.

28. Given the lack of specific technical details from the satellite interests, these potential interference scenarios are difficult to evaluate. In general, however, we believe that the C-Band satellite systems in question may be characterized as follows:

- C-band earth stations for satellite communications links are generally located in remote areas.
- The antennas are pointed skyward and many are located on hilltops.
- The antennas themselves are high gain, directional antennas with significant sidelobe attenuation.
- The antenna feed structures would (should) be expected to include highly selective receive path filters to reject out of band signals, especially the effects of a co-located high power transmitter using the same feed structure to transmit and receive simultaneously.
- The radio signals are generally protected from interference by low loss cables or waveguide structures with high shielding effectiveness.

29. In short, we believe that for a variety of reasons, including the significant investment involved and the desire for reliable service with minimal outages, commercial C-band satellite earth stations operating in or near the 3650-3700 MHz band are (or should already be) highly robust installations in terms of terrestrial interference, whether co-channel, adjacent channel, or out of band in nature.

30. Furthermore, the propagation characteristics in this band limit the potential impact of low power devices. Range for a 1 Watt unlicensed device and omnidirectional transmit and receive antennas is typically less than 0.5 mile on a purely line of sight basis, and, for typical wireless applications in highly reflective environments, no more than about a hundred feet. Obviously, lower power transmitters would exhibit an even smaller sphere of interference potential.

31. We agree that the Commission should consider the rights of incumbent users and create appropriate standards for unlicensed equipment. Our view is the rights of incumbent users would be sufficiently protected in this new band by limitations similar to those imposed by Part 15.247 for intentional radiators.

ADDRESSING THE LEGAL ISSUES RAISED BY CINGULAR WIRELESS LLC

32. In its comments, Cingular Wireless LLC (“Cingular”) asserts that for the Commission to allocate spectrum in the TV broadcast band or the 3650-3700 MHz band for unlicensed use would exceed the Commission’s authority and violate 47 U.S.C. § 301, effectively challenging the entire basis of the Commission’s Part 15 rules

33. This same argument has been raised by the American Radio Relay League (“ARRL”) in other Proceedings before the Commission in the past year or so, and has been refuted,^{12,13} and the Commission has held that it does, in fact, have the authority to authorize unlicensed devices under Part 15 of its rules, given that such devices comply with technical parameters that the Commission has determined to be necessary to assure that there would be minimal potential for harmful interference to other services from such Part 15 devices.

34. As we have pointed out in our filing in ET Docket No. 98-156, the Commission has been very diligent since it first established Part 15, and over the intervening decades as it modified

¹² See, for example, the Opposition to Petition for Reconsideration in ET Docket No. 98-156 filed by IEEE 802.

¹³ See also, the Opposition to Petition for Reconsideration in ET Docket No. 98-156 filed jointly by Agere Systems, Apple Computer, the Bluetooth Special Interest Group, Cisco Systems, Microsoft, and Voicestream Wireless.

Part 15 to authorize new, innovative, and useful types of devices, and has faithfully exercised its obligation to regulate the use of the radio frequency spectrum in the public interest, convenience, and necessity.

35. In the process, the Commission has been guided, both by its own expertise as the competent regulatory agency and by the (often extensive) public comment required under the Administrative Procedures Act, to establish such rules as it determined to be necessary to assure that there would be minimal potential for harmful interference to other services from Part 15 devices.

36. We therefore urge the Commission to once again summarily reject these “Section 301” challenges to its authority to authorize the use of unlicensed devices under Part 15 of the Commission’s rules.

SUMMARY AND CONCLUSIONS

37. We believe that the body of comment in this Proceeding supports the following conclusions:

- That sharing of unused TV channels by unlicensed devices on a non-interference basis is well within the reach of today's technology;
- That incorporating interference-avoidance technology into unlicensed devices to protect incumbent uses will not be prohibitively expensive as AMST, et al, have asserted;
- That unlicensed use of unused TV channels and the 3650-3700 MHz band will provide significant public interest benefits; and
- That unlicensed use of the 3650-3700 MHz band could be approached in a rather straightforward manner, with a Notice of Proposed Rulemaking based generally on the same sort of technical requirements and limitations as in Section 15.247 of the Commission's rules.

38. Therefore, we respectfully request that the Commission expeditiously issue a Notice of Proposed Rulemaking proposing the authorization of unlicensed use of the 3650-3700 MHz band and based generally on the same sort of technical requirements and limitations as in Section 15.247 of the Commission's rules.

39. However, we also believe that the body of comment to date does not contain sufficient detail on technical approaches and proposed rules to support moving directly to a Notice of Proposed Rulemaking on the sharing of unused TV channels by unlicensed devices at this time.

40. For industry to develop proposals for the Commission to consider in the crafting of a Notice of Proposed Rulemaking on the sharing of unused TV channels by unlicensed devices will take some time.

41. Therefore, we respectfully request that the Commission also:

- Reach the tentative determination that the sharing of unused TV channels by unlicensed devices appears to be within the realm of technical and economic feasibility;
- Expeditiously issue a Further Notice of Inquiry, based on that determination, and seeking input from industry on sharing mechanisms and/or spectrum etiquettes to protect incumbent users from harmful interference, along with such other technical parameters and operating requirements as might be necessary; and
- Allow 180 days from the date of publication of the Further Notice of Inquiry in the Federal Register for initial Comments, and an additional 60-90 days for Reply Comments, to allow interested parties a sufficient amount of time to prepare truly meaningful and useful inputs to the Commission.

Respectfully submitted,

/s/

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