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

In the Matter of

Modification of Parts 2 and 15 of the  
Commission's Rules for unlicensed devices and  
equipment approval.

ET Docket No. 03-201

**Via the ECFS**

**COMMENTS OF IEEE 802.18**

IEEE 802.18, the Radio Regulatory Technical Advisory Group ("the RR-TAG") within IEEE 802<sup>1</sup> hereby submits its Comments in the above-captioned Proceeding. This document was prepared and approved by the RR-TAG, and also was reviewed by the IEEE 802 Executive Committee.<sup>2</sup>

The members of the RR-TAG that participate in the IEEE 802 standards process are interested parties in this proceeding. We appreciate the opportunity to provide these comments to the Commission.

**INTRODUCTION**

1. On June 22, 2007, the Commission issued a MEMORANDUM OPINION AND ORDER AND FURTHER NOTICE OF PROPOSED RULE MAKING, under ET Docket 03-201, in which the Commission seeks comment on recommendations by Cellnet Technology ("Cellnet") for inclusion of rules for a spectrum etiquette under Part 15.247 and Part 15.249

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<sup>1</sup> The IEEE Local and Metropolitan Area Networks Standards Committee ("IEEE 802" or the "LMSC")

<sup>2</sup> This document represents the views of IEEE 802.18. It does not necessarily represent the views of the IEEE as a whole or the IEEE Standards Association as a whole.

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of the rules in the 915 MHz band. Later in the proceeding, the Commission enlarges the scope of comments requested to include all of the Part 15.247 and Part 15.249 bands.

2. In our comments, we begin with a brief statement of our position regarding formal spectrum etiquette by rule, wherein the Commission modifies the requirements of Part 15.247 and Part 15.249 to impose specific requirements for spectrum etiquette, versus an industry standards approach which allows market forces and industry needs to drive spectrum etiquette requirements and implementations.
3. We then follow with specific comments with respect to the Cellnet proposals giving our views on the issues raised and recommendations made by Cellnet.
4. In making these comments, we want to point out that IEEE 802 has been and continues to be committed to developing standards which take into account the need for coexistence between unlicensed and licensed devices, and between various kinds of unlicensed devices. Specifically, we point to the following examples of activities currently being undertaken within IEEE 802 which focus on coexistence issues:
  - a. The IEEE 802.22 Wireless Regional Area Networks (“WRAN”) standards development effort, wherein we are working with TV industry representatives, including the Part 74 device industry, to develop a cognitive radio based standard that will allow operation of unlicensed (or lightly licensed) point to multipoint only (excluding point to point) fixed wireless broadband access devices on geographically unused TV channels without interference to licensed operations.
  - b. The IEEE 802.11y Contention Based Protocol amendment to the IEEE 802.11 Wireless Local Area Networking (“WLAN”) standard, which is being developed to support operation in the 3650-3700 MHz band under the FCC’s rules allowing operation of fixed, portable, and mobile devices compliant with Part 90 Subpart Z requirements which implement a contention based protocol supporting joint use with other devices in the band.
  - c. The IEEE 802.19 Coexistence Technical Advisory Group, which acts within the context of IEEE 802 wireless networking standards development activity to develop and maintain policies defining the responsibilities of 802 standards developers for assuring coexistence between unlicensed devices operating under 802 wireless standards.

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5. As these examples indicate, IEEE 802 has developed and continues to develop significant expertise in incorporating coexistence into the design of network standards. In addition, IEEE 802 continues to work with member companies, the FCC, and international regulatory agencies to refine rules for DFS and TPC implementations in the 5 GHz band which support coexistence between WLAN devices and radar systems, reflecting our ongoing commitment to solving these problems.

**IEEE 802.18 RECOMMENDS THAT THE COMMISSION REQUIRE NO SPECIFIC SPECTRUM ETIQUETTES FOR DEVICES DESIGNED FOR USE UNDER PARTS 15.247 AND 15.249 OF THE COMMISSION'S RULES**

6. IEEE 802.18 believes that the work of standards development organizations like IEEE 802 brings the power of innovation to the development of coexistence technologies. We further contend that only through innovation can spectrum etiquettes between unlicensed devices be implemented in an effective manner for high volume, low cost communications applications.
7. Given the wide variety of applications and technologies currently deployed for unlicensed operation under Parts 15.247 and 15.249 of the Commission's rules, it is our opinion that no single set of regulations could be sufficiently flexible to permit the extant applications (unlicensed devices operating in a network environment) to continue operation, while supporting new, unanticipated applications, and simultaneously offering sufficiently robust protocols to assure effective sharing of spectrum among unlicensed devices operating in the same spectrum space.
8. For instance, low throughput, or low duty cycle systems, for telemetry or other similar types of usage, can tolerate "listen before talk" or "duty cycle" based rules without any significant loss of network reliability/effectiveness. But, high rate systems applied to media streaming applications, whether music, voice, or video, may not be able to tolerate a rigid "listen before talk" or "duty cycle" regime due to high network throughput requirements, or limited end to end tolerance of the effects of latency.
9. Looking at the diversity of network styles and applications within just IEEE 802 wireless standards in the 2.4 GHz band, our published standards define networks that use frequency hopping spread spectrum techniques (IEEE 802.15.1, 1 Mbps peak data rate), single channel (non-hopped) MSK spreading techniques (802.15.4-2003 base standard, 250 kbps peak data

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rate), single channel OFDM techniques (802.11, 54 Mbps peak data rate). We are presently working on a variety of amendments to these standards to increase data rate or improve operations, so the evolution of networks will continue for the foreseeable future.

10. IEEE 802 believes that no spectrum etiquette rule can satisfy the needs of all of these published networks standards while remaining flexible enough to permit future innovation to proceed in unlicensed network design and deployment.
11. Innovation in the unlicensed Part 15.247 and Part 15.249 bands has brought tremendous economic and societal benefits to the consumer, and we believe that the addition of spectrum etiquette rules to Part 15.247 and Part 15.249 will unnecessarily constrain innovation.

**IEEE 802.18 RECOMMENDS THAT THE FCC REJECT THE SPECTRUM ETIQUETTE  
PROPOSED BY CELLNET**

12. The essential thrust of Cellnet's recommended spectrum etiquette is to trade network data throughput for transmit power. In other words, by requiring a limit to the duty cycle for devices transmitting at higher power, a limitation is imposed on the length of a transmitted packet for data networks, and possibly, depending on how onerous the rule, the addition of a quiet period in the transmission/reception protocol. The net result is less time for a data network to actually send or receive data for a given power level/duty cycle constraint determined by the rule.
13. So, a high data throughput network at a peak load interval becomes constrained to a smaller coverage area because of the reduced output power requirement, since it may not, for some period of time, meet the duty cycle limitation imposed by the rule.
14. From our perspective, this seems counterproductive, since the economic and social value of a high throughput network increases with the coverage area, and enforcing a duty cycle based etiquette rule reduces the economic and social value of the high throughput network.
15. The focus on duty cycle vs transmit power as a solution to co-channel interference between unlicensed networks overlooks the fact that real, deployed networks based on unlicensed devices have built-in duty cycles and quiet times that have to do with the actual usage pattern of the particular network. Residential networks tend to operate most heavily during the late afternoon through early evening hours in a manner which follows the lifestyles of the users, who are mostly home from work, or from school during the those hours. Most business networks likewise are relatively quiet during the early morning hours, relative to

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the network loading during the middle of the day. These are, of course, generalizations, which may not hold true in specific instances.

16. Low duty cycle telemetry networks can operate co-channel with high throughput networks by using simple techniques to find these naturally occurring quiet times to transmit, or by retransmitting data, etc., even when both networks are operating at high transmit power levels. So, co-channel coexistence where data immediacy requirements are low (i.e., when the data is not required at a very specific time) is not much of an issue in our opinion.
17. Other choices to mitigate co-channel interference when operating under Parts 15.247 and 15.249 include:
  - Changing to a different channel center frequency within the unlicensed band.
  - Choosing to use frequency hopping in order to step around interference, a technique which has proven very effective in IEEE 802.15.1 networks.
  - Changing to a different unlicensed band.
18. Recognizing the fundamental limitations of operation under Part 15.247 or Part 15.249, the wireless network could be designed to operate under Part 15 Subpart D, Unlicensed Personal Communications Services, which does include very specific spectrum etiquette rules.
19. Cellnet's concern is basically a Quality of Service ("QoS") concern, namely that a high duty cycle network, like the high data rate network mentioned in the example above, demands so much spectrum so often that the QoS of the other networks is negatively impacted. As we have indicated in our comments, many other choices can be made in the design of a robust data network within the current Part 15 rules to mitigate interference from other devices in a band and achieve a satisfactory QoS for the desired application. Beyond operation within Part 15 rules, ubiquitous mobile services, and other licensed services provide alternative network infrastructure where QoS has better support
20. The primary reason for the success of unlicensed networking is that the means used to achieve reasonable success in the unlicensed application space are technological, economic, and social in nature. These means are naturally adaptive, and lead to useful services. IEEE 802.18 believes that spectrum etiquette rules like those proposed by Cellnet add no value to unlicensed network operation.

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## CONCLUSION

21. IEEE 802.18 recommends that the FCC reject Cellnet's proposals for spectrum etiquette rules in the 915 MHz band.
22. We further recommend that no rules be added to Part 15.247 or Part 15.249 to mandate formal spectrum etiquette requirements for unlicensed devices.

Respectfully submitted,

Michael Lynch

/s/

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