IEEE 802.18 Radio Regulatory Technical Advisory Group
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June 1, 2004

Director of Spectrum and Radio Services
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Subject: Comments on Public Consultation Paper "*Consultation on Allocation Changes and Revisions to Spectrum Utilization Policy and Technical Rules in the 5 GHz Band*" (Gazette Notice No. DGTP-005-04)

COMMENTS OF IEEE 802.18

IEEE 802.18 [1] IEEE 802.18 hereby submits comments in response to the Industry Canada's Consultation on Allocation Changes and Revision to Spectrum Utilization Policy and Technical Rules in the 5GHz band. IEEE 802.18 believes that licensed exempt (LE) radio spectrum use such as LE-LANs and other operations have been one of the few success stories during the downturn that has affected most of the telecom industry.

The members of IEEE 802.18 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 standards for wireless networking devices, including wireless local area networks ("WLANs"), wireless personal area networks ("WPANs"), and wireless metropolitan area networks ("Wireless MANs").

IEEE 802.18 is an interested party in this Proceeding and we appreciate the opportunity to provide these comments to the Industry Canada.[3]

[1] The Radio Regulatory Technical Advisory Group ("RR-TAG") within the IEEE 802 Local and Metropolitan Area Networks Standards Committee ("IEEE 802" or the "LMSC")

[3] This document solely represents the views of IEEE 802.18 and does not necessarily represent a position of either the IEEE or the IEEE Standards Association.

DISCUSSION

IEEE 802.18 supports IC's proposal to permit LE-LAN devices to operate in the 5.470-5.725 GHz band and also generally supports IC's proposed revisions to its 5 GHz LE-LAN rules but would propose some minor changes and clarifications. IEEE 802.18 urges IC to expeditiously adopt the appropriate revisions to its rules.

1. Proposed Changes to the Table of Frequency Allocations

IEEE 802.18 fully supports IC's proposal to amend the Canadian Table of Frequency Allocations in a manner consistent with the 5 GHz allocation changes adopted at WRC-03. Specifically, IC should adopt its proposal to allow LE-LAN devices to operate in the 5.470-5.725 GHz band. IEEE 802.18 also supports IC's allocation proposal for the Radiolocation, Earth Exploration-Satellite and Space Research Services.

Adding the 5.470-5.725 GHz band to the 5 GHz frequencies already available for use by LE-LAN devices would help address the need for additional spectrum to support and foster the exponential growth in the market for wireless broadband networking technology.

Further, adding this additional 255 MHz to the existing LE-LAN spectrum will enhance the ability of LE-LAN devices to successfully co-exist with the Radiolocation, Earth Exploration-Satellite and Space Research services that will also use these 5 GHz frequencies. The LE-LAN industry and government engineers – as well as the international community – spent considerable time and effort developing the technical solutions that will now permit a multitude of important services to share 5 GHz frequency bands globally. All of those solutions envision the availability of this additional spectrum.

2. Proposed Changes to the LE-LAN Rules

In the lengthy preparation for WRC-03, government and private sector engineers worked together to develop the technical solutions that would allow LE-LAN devices to share 5 GHz frequencies with radiolocation and other services. The modeling they performed showed that there were two key technologies for successful sharing: DFS and TPC.

3. Dynamic Frequency Selection

IEEE 802.18 supports IC's proposal that requires the use of DFS in the 5.250-5.350 GHz and 5.470-5.725 GHz bands. IEEE 802.18 further supports the DFS detection threshold levels and technical parameters as presented in Appendix 3 of the Gazette, which are the same as those adopted as an ITU Recommendation and, as a result, seem likely to be adopted globally. It is logical for these thresholds to be adopted in Canada.

IC has also proposed that, where multiple devices are under the direction of a central controller, only the central controller is required to have DFS. IEEE 802.18 fully supports this proposal. In many wireless network architectures the remote devices (such as a laptop) are "associated" under the control of a "central controller" (*i.e.*, an access point), so also requiring DFS in both the access point and its associated remotes would be redundant. Such redundancy would increase both the cost and complexity of the remote units. It may increase the likelihood of the disruption of network operation because of increases in the false alarm rate for radar detection.

IC also noted that DFS threshold levels adopted by ITU are keyed to a 1 MHz bandwidth and, therefore, seeks comment on whether a bandwidth correction factor is necessary for LE-LAN devices with a receive bandwidth less than 1 MHz. IEEE 802.18 is unaware of any attempt to model the interference potential of systems using less than a 1 MHz channel, and thinks IC should be cautious in adopting a correction factor in the absence of a widely accepted analysis.

In addition, IC notes that the ability of DFS to reliably detect the presence of a radar depends on the pulse characteristics of the radar. Therefore, it seeks comment on the minimum number of radar pulses and observation time needed for reliable detection of radar signals. The proposed DFS thresholds for a 1-microsecond pulse are so sensitive that a single radar pulse that is not masked by other interference and that exceeds the threshold will be detected by LE-LANs with a very high degree of probability. This is due to a radar pulse, like a LE-LAN packet, being characterized by a power rise at its start, and it is this property that is exploited in a LE-LAN to maximize sensitivity to incoming packets. In normal operation, a LE-LAN receiver is on hair-trigger alert to detect packets with high degree of probability at incoming power levels as low as –82 dBm. The probability of detection increases greatly with increased incoming power levels and is very high at the proposed DFS threshold levels, which are some 20 dB above the –82 dBm level. Masking can complicate further analysis but based on the work already done, IEEE 802.18 believes that any further refinement of these parameters is best done in the course of developing DFS compliance testing procedures. Codifying these parameters prior to the completion of the work on compliance testing procedures could lead to rules that are overly burdensome or that limit the flexibility for DFS implementations in particular devices. Rather, IEEE 802.18 recommends that when these parameters are developed that they be written into compliance test procedures.

4. <u>Transmit Power Control</u>

Aligned with the ITU Recommendation, IC proposes a requirement that devices operating in the 5.470-5.725 GHz band employ Transmit Power Control ("TPC") to reduce the potential for impact on EESS and SRS operations. IEEE 802.18 supports the imposition of a TPC requirement. IEEE 802.18 believes that IC's proposal needs some clarification.

The development of the WRC-03 position on DFS trigger levels included consideration of TPC when modeling how LE-LAN systems might affect radiolocation services. Noting that TPC was already planned for most LE-LAN systems, the DFS modeling assumed an average 3 dB drop in power due to TPC (referenced to a maximum EIRP of 1 watt). In the course of normal operation (with TPC), and without any non-system trigger, radar systems would see at least an average 3 dB drop in LE-LAN energy compared to an environment where LE-LANs constantly operate at maximum EIRP. Therefore, IC's goal should be to create an LE-LAN environment that when "viewed" by radar should appear – on average – to be 3 dB below 1-watt EIRP.

There are a number ways to accomplish this. One is to require TPC for every device authorized. This approach would certainly result in a 3 dB drop or more in the "LE-LAN radiated power" environment. A potentially better approach would be to require the requisite reduction in power due to TPC only in systems with an EIRP of 500 mW or more. The latter approach is more flexible and could reduce unnecessary circuitry and cost in lower power devices. This, of course, would result in lower consumer costs and faster adoption of wireless broadband devices. Consequently, IEEE 802.18 proposes IC clarify its proposal and rule to permit devices certified for use in systems with an EIRP of 500 mW or less to forego TPC.

IEEE 802.18 also urges the IC *not* to specify specific algorithms and parameters for transmit power control mechanisms. Manufacturers have great incentives to employ TPC in their broadband systems and are already doing so. They have already developed a variety of algorithms and architectures to implement TPC. It would be both unnecessary and unwise for the IC to codify specific TPC parameters.

5. Test Procedures

Currently private sector and government engineers are working in an open and informal process to develop and propose compliance testing procedures that will ensure that future LE-LAN devices meet the DFS requirements. IEEE 802.18 recommends that IC consider these test procedures to certify devices under this rule.

6. Transition

IEEE 802.18 believes that there must be an adequate transition period prior to the new rules becoming effective. It seems quite possible that the spectrum utilization policy will be implemented prior to the test procedures being available. IEEE 802.18 suggests that the transition for the 5250 – 5350 MHz band begin when the test procedures are approved. The requirement for all new LE-LAN equipment to be certified should be one year after that date and the sale of previously certified products should be permitted up to two years from that date.

7. Technical Requirements for the 5 GHz LE-LAN Bands

IEEE 802.18 also supports, with just some exceptions, IC's proposal to apply other technical parameters in the 5.250-5.350 GHz band and to the 5.470-5.725 GHz band in updated RSS-210 radio standard specifications. This proposal is consistent with the range of technical parameters adopted for this band by WRC-03.

A key to the success of 2.4 GHz broadband wireless systems has been their reasonable cost for consumers, educational institutions, governments, and businesses. Similarly cost also plays an important role in the success or failure of 5 GHz broadband wireless systems. There are, however, IC regulations that are now applicable to 5 GHz devices that add to manufacturing costs without providing a corresponding benefit. IC should not import these rules into the new LE-LAN bands. It would make more sense to take this opportunity to eliminate these rules from the current bands.

One such regulation is the requirement in RSS-210 of an “integral” antenna for a system operating in the 5.150-5.250 GHz band. There is a general industry consensus that the restrictions in this band on antenna gain and transmit power, coupled with the prohibition on outdoor use, are sufficient to provide protection to the MSS feeder. That general consensus is correct. The integral antenna requirement does not provide any additional protection to these services. It should now be eliminated rather than imported into the new LE-LAN band.

Another issue we wish to address is the recommendation of the antenna emission mask or additional restrictions in the 5250 MHz band as adopted in Resolution 229 (WRC-03) and incorporated recommendations, and in the CITEL IAP as an additional protection criteria for EESS. The current Canadian regulations as given in RSS-210 allow a maximum power of 1W EIRP and outdoor use in the 5250 – 5350 MHz band with no restrictions.

The proposed adoption of the antenna mask was to provide added protection for the Earth Exploration Satellite Service. Currently these unlicensed systems operate on a non interference basis and would be required to address the issue if interference occurred. However under the current rules outdoor use at 1W EIRP without the mask is currently allowed and the operation of these low cost systems has not impacted EESS.

In our engineering reviews we have determined that the mask would limit the 5250-5350 MHz band to short range point to point use only. We believe that implementing the elevation mask is not necessary to provide adequate protection to the EESS.

Respectfully submitted,

/s/
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