

Carl R. Stevenson

To: Shellhammer, Stephen J; paul.nikolich@att.net; STDS-802-SEC@listserv.ieee.org
Subject: RE: [802SEC] +++EC Email Ballot+++Urgent motion to approve 802.18 doc+++
Importance: High

Steve,

Response to your comments in line below for context ...

(for those whose mail clients may not support HTML e-mail and would, therefore, make the text below VERY ugly, I am attaching a .pdf version of this message, which I assume that everyone should be able to find readable)

From: Shellhammer, Stephen J [mailto:stephen.j.shellhammer@intel.com]
Sent: Tuesday, November 23, 2004 12:37 AM
To: paul.nikolich@att.net; STDS-802-SEC@listserv.ieee.org; carl.stevenson@ieee.org
Subject: RE: [802SEC] +++EC Email Ballot+++Urgent motion to approve 802.18 doc+++

Carl,

I vote No but will change my No to a Yes if my recommendations listed below are implemented.

My fundamentally concern is that,

In this response to the FCC NPRM the IEEE is recommending to the FCC that they place additional restrictions on IEEE 802 devices above and beyond what the FCC is proposing in the NPRM.

The objective is to gain access to the TV bands ON A NON-INTERFERING BASIS TO LICENSED INCUMBENT SERVICES. The studies that have been conducted show, quite conclusively, that some of the proposals in the FCC NPRM have shortcomings that, if implemented "as is," would result in interference to licensed incumbent services. That would be a major disaster. Systems would have to be shut down when they caused interference and the result would both have a negative impact on producers and users of those systems and would "poison the well" for future unlicensed under licensed spectrum sharing opportunities until long after most of us on the EC are likely to be retired.

Specific comments follow ...

Special Protection for Part 74 Wireless Microphones

The FCC NPRM stated that because of the FM capture effect and a strong received signal strength of the wireless microphones, "the likelihood of interference from unlicensed device signals is therefore low such that unlicensed use should generally be compatible with wireless microphones", and imposes no further restrictions on unlicensed 802-type devices.

Since my first job as an RF engineer many (many) years ago was designing studio/broadcast quality wireless microphone systems, I have some significant personal and professional experience in this area.

Yes, FM does exhibit a capture effect, but it is NOT the be-all/end-all that can/should be relied upon. There are other factors, such as intermodulation, front-end overload, etc. which must be considered in the equation.

Additionally, the assumption that signal strengths in wireless microphone systems are so strong that there is no issue is simply false. Most wireless microphones are relatively low power devices and hand effects on handheld ones and body effects on body pack ones are very significant, further reducing signal strength at the wireless microphone receiver to the point where link margins can be, and frequently are, slim.

I could go on, but suffice it to say that the studies conducted by 802.18 and 802.18 SG1 in cooperation with the wireless microphone folks show that simply relying on FM capture effect will NOT afford Part 74 wireless microphone systems the protection to which they are legally entitled.

However, the IEEE 802 response to the FCC NPRM recommends adding the following requirements on Part 15 unlicensed devices:

1. The Part 15 must be able to sense the operation of a Part 74 device

Everyone agreed that a sensing mechanism would be required to sense channel occupancy by TV stations. Of that, there was no dispute. The threshold proposed in the Comments for wireless microphones is less stringent than that proposed for sensing TV stations, and thus will be easier to meet (by 10 dB). The differential is based on the difference in modulation/spectral characteristics between wireless microphones and TV signals. Also, since the sensing mechanism will already be required and in place to sense the TV stations, "where's the rub?"

However, while the proposed -107 dBm sensing threshold for wireless microphones, will, as stated in the comments, provide SOME DEGREE of protection to Part 74 wireless microphones, it will not provide robust protection in many circumstances (never the less, the wireless microphone folks and the broadcasters agreed to this less than perfect number in recognition that, due to their different spectral characteristics, meeting a more stringent number WOULD make things more difficult for unlicensed devices). By the way, the number originated in studies done by 802 folks, not from the wireless microphone folks, and was derived as a "best effort" attempt to afford them the protection to which they are entitled and be responsible sharing partners.

These devices ARE entitled to protection. Under Part 74, they are secondary to the primary TV broadcast service, but secondary "trumps" Part 15 unlicensed every day (and twice on Sunday, as they say). If we interfere, they will legally be justified in demanding that we cease operation. Again, that would be a "very bad thing." (I would think that as Chair of the Coexistence TAG, you would favor being good sharing partners - especially when doing so essentially comes at no cost.)

2. The Part 15 device must be able to sense the presence of a yet-to-be defined beacon emitting from a Part 74 device

The idea of a beacon was offered up by the wireless microphone folks as a way of helping us protect them, despite the fact that as licensed users they are not required to do ANYTHING to help us protect them. They COULD legally, just say "Protect us as we are, it's YOUR problem." but have not done so.

Fielding beacons to increase our ability to sense them and provide a small, more robust "bubble of protection" **around certain critical venues** is something that **they** offered **in the spirit of cooperation**. Doing so will cost THEM something (the cost of providing the beacons) - again something that they were under no obligation to offer up, but that they did in the spirit of cooperation.

The idea of the beacon is intended to avoid the situation where unlicensed devices could "trash" critical operations at major events. Imagine the ramifications of our devices trashing the SuperBowl, the recent national political conventions, coverage of major news event like 9/11, and other events of that magnitude, where there are routinely on the order of 100-200 or more wireless microphones (including "in-ear monitors" and other "intercom-like" systems in operation) - all of which fall under Part 74, which, again, is entitled to protection from harmful interference from unlicensed devices.

Yes, the beacon is "yet-to-be-defined" but the concepts that have been discussed are VERY simple and, given the requirements for a sensing mechanism for the primary TV signals, would cost the developers of 802 devices intended to operate in the TV bands virtually nothing (quite likely absolutely nothing).

The wireless microphone people are committed to working cooperatively with us to further define the beacon concept and parameters in a way that will make it simple for them to build cost-effective beacon devices and for us to detect those beacons.

I don't believe (and 802.18 did not believe) that taking the attitude of "We don't care if they're licensed and entitled to protection or not, we'll just ignore the results of our studies and rely on the FCC to ignore the rights and legitimate needs of the wireless microphone folks." would be an appropriate approach for 802 to take. Again, I would hope that, as the Chair of our Coexistence TAG, you would agree.

It seems that the IEEE 802 is requesting additional restrictions be placed upon its devices above and beyond those recommended in the FCC NPRM.

The fundamental requirement to gain (and keep) access to this valuable spectrum is to protect licensed services. Since our studies over the course of an entire year indicated that the FCC's NPRM proposal vis a vis wireless microphones under Part 74 was less than adequate, we believed that it was appropriate to suggest something that all parties involved agreed was reasonable (and, again, the wireless microphone folks have been VERY reasonable). **Just because the FCC proposes something in an NPRM does not mean it is not subject to discussion or suggestions for alternatives - in fact, that's why the comment/reply comment process exists - in recognition that initial proposal may not always address all issues adequately and to seek comment that will help the FCC end up making better decisions.**

I have heard rumors of suggestions from certain parties that "The FCC doesn't really care about protecting Part 74 wireless microphones going forward, so why should we do anything or say anything that would support their (current) right to protection." I believe that that approach is irresponsible and based on a flawed view of the FCC's approach to/intentions in this matter that, in turn, is based on reading too much into the NPRM proposal language (which again, our studies showed would be inadequate).

In fact, I just got off the phone with a very senior level official in the FCC's OET seeking clarification on this issue, and he assured me that 1) they have NO intention of abandoning the protection rights of Part 74 secondary devices like wireless microphones, and 2) they have been very impressed with both the technical presentations and the sense of responsible, cooperative outreach towards the unlicensed community that has been evidenced by the wireless microphone folks in their ex parte presentations at the FCC.

It does not seem like that is in the best interest of IEEE 802.

It does not seem to me that it is in the best interest of IEEE 802, or the unlicensed industry and its users in general, to fail to propose more viable mechanisms to help assure that we can, in fact, coexist, since coexistence (in this case not causing harmful interference to licensed users) is a fundamental requirement for gaining, and maintaining, access to the spectrum in question.

Unlicensed under licensed sharing is a VERY different ball game than the unlicensed vs. unlicensed "food fights" in the ISM bands.

Recommendation

Remove Paragraphs 26, 27, 36 and 37.

Removal of these paragraphs files in the face of our own technical studies which resulted in the proposals therein. It would also fly in the face of our obligation to afford these licensed uses protection to which they are entitled.

While both the 802 folks and the wireless microphone and broadcast folks who were involved in the studies and discussions that resulted in these paragraphs agreed (and the wireless microphone and broadcast folks accepted) that the proposals in these paragraphs do not guarantee 100% absolute protection to Part 74 wireless microphones, we collectively believed (including the wireless microphone and broadcast folks) that the proposals in the subject paragraphs represent a reasonable and responsible compromise.

In summary, the text in the subject paragraphs was agreed by ALL parties participating in the discussions in 802.18 (the document was approved unanimously in 802.18), including the voting members from the organization that I am given to understand has subsequently raised these issues and wants the paragraphs deleted.

To remove these paragraphs would represent a substantive change to the document that would exceed the editorial authority given by 802.18 in its approval motion and would, in my *personal* view be an affront to the cooperative spirit that the wireless microphone and broadcast folks brought to the table on this issue.

Finally, backing out on this compromise, that all involved agreed was reasonable, at the 11th hour and 59th minute would also, I fear, cause ALL of the incumbents that have been working with us to legitimately question whether they can rely on us to keep our agreements with and commitments to them in the future.

Requirement for Professional Installation

The FCC NPRM proposes two installation methods for the fixed/access class:

1. Geolocation coupled with database access

Geolocation can be problematic (GPS doesn't work well indoors or in heavily shadowed areas, for example) and WHAT database? The FCC database of TV transmitters is, by all accounts full of inaccuracies and omissions (meaning no disrespect to the FCC as we all know that they have limited resources) and is not likely to be

improved and/or maintained to a sufficient level of accuracy, due to resource limitations. These factors, in our view, rendered dependence on this mechanism to protect TV broadcast service inadequate as a sole/primary means.

Likewise, geolocation/database techniques would prove inadequate to protect Part 74 users.

These considerations are, we believe, explained sufficiently in other sections of the comments.

2. Professional installation

In paragraph 25 of the IEEE response to the FCC NPRM it states that GPS may be the most practical means of protecting Part 90 devices.

Part 90 devices have allocations in TV channels 14-20 in the top 13 urban areas of the US. Their area of entitlement to protection is defined as a radius surrounding specified geographical coordinates. The "database" required to protect those 13 urban centers is well-defined, very static, and could be contained in an unlicensed device. This is a much more tractable situation than the database issues surrounding protecting TV broadcast operations and Part 74 devices, so GPS and this (limited) "database" may be viable for the Part 90 case.

However, the title of paragraph 28 states that professional installation is required and does not allow for GPS with database access as an alternative mechanism.

Professional installation is recommended only for the fixed access base station and a "one-time" GPS geolocation of such stations is proposed, rather than requiring all fixed access devices to have an embedded GPS receiver. (Obviously "personal portable" devices cannot be professionally installed, and this paragraph does not deal with category of operation at all.) Furthermore, the text of that section goes to some length to argue against a professional installation requirement for CPE's (user terminals).

Once again, relying on GPS/database as the sole, or primary, means of determining channel availability is, per our studies, insufficiently robust.

Once again the IEEE is recommending that the FCC place additional requirements on Part 15 devices above and beyond those recommended in the FCC NPRM.

Once again, it does not seem to me that it is in the best interest of IEEE 802, or the unlicensed industry and its users in general, to fail to propose more viable mechanisms to help assure that we can, in fact, coexist, since coexistence (in this case not causing harmful interference to licensed users) is a fundamental requirement for gaining, and maintaining, access to the spectrum in question.

Unlicensed under licensed sharing is a VERY different ball game than the unlicensed vs. unlicensed "food fights" in the ISM bands.

Recommendation

The following words should be added to the beginning of Paragraph 28: "In instances where geolocation with database access is not used, ". These same words should also be added to the end of the heading immediately preceding Paragraph 28.

Since we determined (over the course of a year's studies) that the "geolocation with database" technique was problematic as a sole/primary interference prevention mechanism, for the reasons outlined in the document, it would be inconsistent to appear to be advocating it as a (presumably, if we were to make the change you propose) viable option.

I also believe that these changes are sufficiently substantive, and contradict the overall conclusions/explanations elsewhere in the document, as to exceed the editorial authority granted in 802.18's motion to approve the document.

Regards,
Steve

Steve Shellhammer

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Summary

802.18 and 802.18 SG1 (which was tasked with studying the issues surrounding gaining access to the TV bands on an unlicensed, non-interfering basis) have studied these issues and worked with the incumbents for over a year on studies, discussions, and compromises designed to meet everyone's legitimate needs in a reasonable manner.

Everyone and anyone who had an interest and the desire to participate in those studies, discussions, and compromises was, of course, fully welcome to do so.

If seems unreasonable to me for parties - who I am given to understand WERE represented in the work of 802.18/802.18 SG1 and whose representatives there voted to approve this document or other parties who chose not to avail themselves of the opportunity to participate at all - to "come out of the woodwork" at the 11th hour and 59th minute with attempts to back out on these carefully and delicately crafted compromises, that all involved in the process agreed were reasonable and acceptable.

Again, I fear, that such a move would cause ALL of the incumbents that have been working with us to legitimately question whether they can rely on us to keep our agreements with and commitments to them in the future.

Regards,

Carl R. Stevenson

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