

IEEE 802.16 Working Group on Broadband Wireless Access

<http://WirelessMAN.org>



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To: Ron Resnick
President, WiMAX Forum

Subject: Liaison Statement to WiMAX Forum regarding correspondence with ITU-R WP 5D on ACS

The IEEE 802.16 Working Group kindly thanks the WiMAX Forum for the opportunity to review its draft liaison contribution on ACS to ITU-R WP 5D (Documents [IEEE L802.16-08/026](#) and [IEEE L802.16-08/027](#)). We respectfully propose the revision shown in Attachment 1 for your consideration.

We are proposing the removal of the formula in the analysis section because we were uncertain regarding its derivation and underlying assumptions, pending the response from WP 5D. Furthermore, the specific equation is not necessary to justify any points here because, irrespective of whether the formula correctly represents the relationship between ACR and ACS, the key point is that any relationship among the parameters involved would require that they all had been evaluated under identical conditions.

We are also proposing the removal of the table because its contents are not directly applicable to supporting the points made in the draft liaison statement. Furthermore, since the text does not support the validity of the specific ACS figures in the table, presenting them in the table could be misleading.

We look forward to continue working cooperatively.

Attachment 1: Proposed revision to draft liaison contribution from WiMAX Forum to WP 5D on "RESPONSE TO REQUEST FOR CLARIFICATION ON OFDMA TDD WMAN BS AND MS ACS VALUES"

cc: Paul Nikolich, Chair, IEEE 802 Executive Committee

Attachment 1

Proposed revision to draft liaison contribution from the WiMAX Forum to WP 5D on “RESPONSE TO REQUEST FOR CLARIFICATION ON OFDMA TDD WMAN BS AND MS ACS VALUES”**Introduction**

The WiMAX Forum thanks WP 5D for its liaison of 31 January 2008 to the WiMAX Forum and IEEE entitled ‘Request for Clarification on OFDMA-TDD-WMAN BS and MS ACS Values’. This document is a response to that liaison.

We note that IEEE (in Doc. 5D/108) has indicated “plans to work cooperatively with the WiMAX Forum in order to develop a complete response.” In this contribution we have incorporated comments from the IEEE 802.16 Working Group.

Analysis

We do not agree with the application of the formula cited in the WP 5D liaison statement for the following reasons.

1. While WP 5D’s formula calculates ACS on the basis of ACR and SNR_{min} , any such formula can be valid only if SNR_{min} and ACR are measured using the same set of conditions, that is, the same modulation and coding scheme, the same propagation channel, the same assumed specific data rate, and the same BER threshold; i.e., the only difference between the SNR test and the ACR test is the addition of the adjacent channel interference and the increase in the wanted signal level by the specified margin. Additionally, the same assumptions must be made for frequency separation between the interfering channel and the victim channel (as the wanted channel); e.g., the channel selectivity corresponding to an out of band channel should be calculated using the channel rejection characteristic corresponding to an out of band channel, the first adjacent channel selectivity should be calculated from the first adjacent channel rejection, etc. The resulting calculated ACS would then reflect a consistent set of test conditions.

In this particular case, the ACR values in OFDMA TDD WMAN assume that the mandatory Convolutional Coding is used, whereas the SNR values cited are those for the default mode of operation based on Convolutional Turbo Codes.

IEEE Std 802.16, whose characteristics for sharing studies are reflected in Report ITU-R M. 2116, specifies ACR and also suggests SNR values for various modulation schemes. However, IEEE Std 802.16 has not specified ACR requirements for the most robust modulation and coding scheme (MCS) level (i.e., QPSK $\frac{1}{2}$ with possible repetition factor), although we expect that the ACR would be increased in proportion to the reduction in SNR moving from 16 QAM $\frac{3}{4}$ to QPSK $\frac{1}{2}$. Typically, the sharing analyses are performed at the most robust MCS level consistent with the assumed data rate, as discussed earlier in this response.

As the assumed coding and modulation schemes differ, these ACR and SNR values cannot validly be used to calculate ACS.

2. A real receiver consists of multiple components and the overall selectivity will depend on all of them. The ACS value derived from requirements in the standard is only part of the complete analysis.
3. IEEE Std 802.16 (and indeed Rec. ITU-R M.1457 as well) specifies receiver performance without regard to operating frequency. As a consequence, real equipment in a specific band might outperform the minimum requirement, since it is a minimum for all bands.
4. At an FDD/TDD boundary, improved performance is often necessary, and Base Station performance will significantly exceed the general minimum requirements. This is explained in footnote (1) to Table 1 in Report ITU-R M.2116: “Note that the ACLR and ACS values used for the IEEE 802.16e system in this report are intended only for coexistence studies and apply to channels close to a FDD/TDD boundary. These values are not minimum performance requirements, which have not yet been specified.”

The BS receiver filter characteristics for the specific boundary situation would typically be decided by the operator, taking into account local regulatory requirements, and would be expected to differ from the minimum value in the base standards that apply to all RF channels including those away from the TDD/FDD boundary. Indeed, these same minimum values have to be met in every frequency band covered by the standard.

5. For coexistence purposes, ITU-R sharing studies have typically used base station ACS protection levels exceeding minimum performance numbers required by the standards, in order to reflect the boundary situation. This is also acknowledged and characterized by Report ITU-R M.2045, “Mitigating techniques to address coexistence between IMT-2000 time division duplex and frequency division duplex radio interface technologies within the frequency range 2 500-2 690 MHz operating in adjacent bands and in the same geographical area”. In particular, Section 7 shows BS ACS improvements of greater than 68 dB in the first and adjacent channels, over the minimum number specified by the standards.

Conclusion

The WiMAX Forum thanks ITU-R Working Party 5D for the opportunity to clarify the relationship between the various adjacent channel parameters of OFDMA TDD WMAN. We hope that these explanations will resolve your concerns about any perceived inconsistencies.

We expect to make contributions to address a future revision of Report ITU-R M.2039.
