Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Proposed Responses to Disapprove Comments in 802.16 Letter Ballot #4**
Date Submitted	**2002-05-13**
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Re:	IEEE 802.16-02/21 and C802.16a-02/52
Abstract	This contribution proposes revised rebuttals to the Disapprove comments of Letter Ballot #4, as recorded in IEEE 802.16-02/21. It also raises concerns with similar proposals in C802.16a-02/52.
Purpose	The source proposes that these proposed rebuttals be adopted as the basis of a rebuttal letter, subject to revision upon finalization of the content of the next 802.16a draft forwarded for Sponsor Ballot.
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Proposed Responses to Disapprove Comments

in 802.16 Letter Ballot #4

Roger B. Marks

Introduction

In IEEE 802.16 Working Group Letter Ballot #4, the Working Group approved a motion to "accept the comment resolutions from Recirculation Ballot #4a, as recorded in Comments 770-1178 of IEEE 802.16-02/01r13; and to forward, for IEEE 802 LMSC Sponsor Ballot, IEEE P802.16a/D3-2002." Upon forwarding the draft (IEEE 802.16-02/21), the 802 Sponsor Executive Committee (SEC) rejected the request. Several SEC members raised concerns regarding the nature of the group's rebuttal of the Disapprove comments.

In accordance with Letter Ballot #5, which seems likely to be approved, the Working Group will be authorized to initiate a new Working Group Letter Ballot on sending a draft back to the SEC. This action would, in effect, wipe the slate clean, in the sense that Disapprove comments from Letter Ballot #4 would no longer be relevant to a request for Sponsor Ballot. Therefore, the Working Group could simply choose to ignore the Disapprove comments from LB #4. On the other hand, some SEC members may nevertheless inquire about the status of the earlier rebuttals. The Sponsor Ballot request would therefore be more secure if the WG adopted a revised set of rebuttals.

Without a specific format for such revised rebuttals, I suggest that the most appropriate form would be a letter addressed to the Disapprove voters, informing them of the status of the draft and providing them the updated responses.

In this contribution, I propose the content of rebuttals to the Disapprove comments of LB #4.

Below, I make use of the contents of contribution C802.16a-02/52, which also proposed rebuttals. I voice concern regarding the proposals in C802.16a-02/52. I also include below, in each case, the Proposed Remedy that was rejected by the Working Group, since these were not cited in C802.16a-02/52 but generally represent the core subject to be addressed in the rebuttal.

The proposed content is temporary ; the final content cannot be determined until the revised draft is complete for resubmission to the SEC. However, I propose that the rebuttals here be the basis of a rebuttal letter to be approved when a draft is essentially ready for the SEC.

Note on Coexistence issue raised in C802.16a-02/52

Contribution C802.16a-02/52 said, "we have to come up with a resolution for the IEEE802.11 and IEEE802.16a coexistence issue. Possibly the interested IEEE802.16a member's participation at the newly formed WG 'IEEE802.18' will be the way to resolve the issue."

I dispute this suggestion. IEEE 802.18 (which is the Radio Regulatory Technical Advisory Group, not a WG), has nothing to do with this problem. I believe it would be more appropriate to continue to suggest that 802.11 members pose any coexistence concerns as 802.16 Working Group Letter Ballot comments.

Proposed Content Of Rebuttals

1- Comment # 34 (by David Trinkwon)

Original comment:

With this proposed amendment, IEEE 802 will offer six (or more) air interfaces for license exempt bands:

a) 802.11 variants
b) 802.16 OFDM PMP 64-FFT
c) 802.16 OFDM PMP 256-FFT
d) 802.16 OFDM PMP 512-FFT
e) 802.16 OFDM Mesh
f) 802.16 OFDMA.

There is no information presented in the Draft Amendment to enable a comparative analysis of these alternatives to enable vendors, service providers or end users to determine suitability / appropriateness for their particular applications (e.g. capacity, coverage, reliability, relative cost).

There is also no requirement / mechanism to define / identify CPE compatibility / interoperability between the alternatives, either on a PMP, Mesh or PMP-Mesh basis. Is this a family of complementary standards or a collection of disparate standards?

Proposed rebuttal (IEEE C802.16a-02/52):

There are only 3 PHY variants:

   1) Single Carrier
   2) OFDM
   3) OFDMA

Single carrier (SC2) is an extension of the current 802.16 standard with framing features to implement Frequency Domain filtering to handle delay spread in 2 to 11 GHz based on a 256 FFT point transform. The OFDM mode is based on a mandatory 256 Point transform (making a common frame and architecture with single carrier). Finally, OFDMA mode is provided to make use of DVB standard for down stream and the use of FDM multiplex upstream carriers to provide efficient multiple access.

The standard must be applied across a broad range of application including integrated Voice and Data access as well as best efforts data. The multiple PHY layers provide flexibility to meet these service categories.

In addition, the interoperability between the 3 main PHY specifications might be a WiMAX matter.

Original Remedy Proposed

Add a Summary table of the various alternatives in the Overview, together with main characteristics / differentiators.

Create an ad hoc group to add an informative appendix containing the comparative performance / evaluation characteristics of the alternatives (incl 802.11).

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

This premise of the proposal is completely wrong because it fails to recognize that the comment refers to license-exempt bands. Furthermore:
*The paragraph on applications is MAC-oriented, while the comment is PHY-oriented.
*It does not address the proposed remedy.
*The reference to WiMAX is irrelevant and inappropriate.

Rebuttal proposed by Marks:

In license-exempt bands, 256-point OFDM has been defined as mandatory. Therefore, the WG believes that the comment has been superceded and is no longer relevant.

2- Comment # 35 (by David Trinkwon)

Original comment:

With this proposed amendment, IEEE 802 will offer five (or more) air interfaces for license bands:

a) Single Carrier PMP (10-66GHz)
b) Single Carrier PMP (2-11GHz)
c) OFDM PMP (various FFT sizes)
d) OFDMA (DVB) PMP
e) OFDM (AMB) PMP
f) Potential future Mesh modes.

There is no information presented in the Draft Amendment to enable a comparative analysis of these alternatives to enable vendors, service providers or end users to determine suitability / appropriateness for their particular applications (e.g. capacity, coverage, reliability, relative cost).

There is also no requirement / mechanism to define / identify CPE compatibility / interoperability between the alternatives. Is this a family of complimentary standards or a collection of disparate standards ?

Proposed rebuttal:

All PHY layer specifications have been evaluated against the SUI channel models and they meet the required performance for 802.16a. The choice of PHY layer is more a function of vendor system implementation including analog / RF complexity. There is precedence for multiple Air Interface standards, for example, with 802.11 having 3 PHY specifications of OFDM, Single Carrier Direct Sequence, and Frequency hopping FSK.

Original Remedy Proposed

Add a Summary table of the various alternatives in the Overview, together with main characteristics / differentiators

Create an ad hoc group to add an informative appendix containing the comparative performance / evaluation characteristics of the alternatives (incl the existing 802.16 air interface). Bearing in mind the NLOS FRD Requirments, all compartive analysis should be done at a 16-QAM benchmark modulation rate.

Contribution 802.16.3c-01/41 (accepted by TG3 at Mtg #12 (Hilton Head Island) includes the "Key System Characteristics and Evaluation Criteria" which should be used for comparative analysis of the alternatives by Service Providers and Regulators.

Doc 802.16.3c-01/29r4 {accepted by TG3} includes the approved Channel Models to be used for the comparative analysis.

Doc 802.16.3c-01/30r1 includes the approved traffic models to be used for the comparative analysis.

(There have been no contributions on deployment models for comparative analysis).

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

The proposed rebuttal does not to address the proposed remedy. The reference to 802.11 is inappropriate, since the balloter is not interested in 802 precedent and since 802.11's dual-RF-PHY solution is not a positive example.

Rebuttal proposed by Marks:

The set of mode options has been reduced to the minimum acceptable to the WG, which believes that a variety of alternatives is required to support operation in the many regulatory and service environments in which the standard may be applied.

The WG appreciates the suggestion of a summary table and has added one (Table XX).

The WG does not accept the request to form an ad hoc group to develop a comparative performance study. The WG believes that such a group would not reach consensus. Potential users must be willing to make their own decisions based on their own usage scenarios.

3- Comment # 49 (by Tom Kolze)

Original comment:

This MAC departs greatly from DOCSIS 1.1 MAC, although our working group has heard from some license holders that consider it highly desirable to be aligned with DOCSIS MAC. The changes to DOCSIS 1.1 MAC necessary for adaptation to wireless is very minimal, as discussed and presented in numerous presentations to the working group. Even given the above two facts, the working group DID vote to eliminate from consideration all but a small set of documents for forming the basis of its common MAC, and specifically voted DOWN the motion for INCLUDING DOCSIS 1.1 MAC in the set of documents which could be drawn upon. It is not surprising that the 802.16 MAC is a vast departure from the DOCSIS MAC, given this set of votes. The only surprise is that the group voted in this pattern in the face of license holders expressed wishes otherwise. It is my position that the 802.16 standard needs to align its MAC to the DOCSIS world.

This change in course for 802.16 will require some extensive rewrite of the section 6, but, given the maturity and successful deployment of the DOCSIS MAC, will lead to SPEEDIER execution of the 802.16 standard.

Suggested remedy by original commenter:

Adopt and build upon the recommendations and proposals from the individuals within 802.16 supporting the DOCSIS MAC.

Reason for Group's decision/resolution:

The title of the project PAR ("Medium Access Control Modifications and Additional Physical Layer Specifications for 2-11 GHz") makes it quite clear that the intent of the project is to develop modifications to the MAC described in IEEE Standard 802.16. The Working Group has consciously

made the decision, again and again, that the 802.16 MAC is best suited for wireless metropolitan area networks.

[Reason developed by Roger Marks and entered 4 April 2002]

Proposed rebuttal:

This comment is well responded.

We would also add that DOCSIS has an extreme flaw by not having ARQ integrated at the MAC layer. Given the RF channel dynamics. ARQ is required to ensure the delivery of required data throughput.

Original Remedy Proposed

Adopt and build upon the recommendations and proposals from the individuals within 802.16 supporting the DOCSIS MAC.

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

It is better not to add a specific comparative detail; this would only serve to raise additional questions.

Rebuttal proposed by Marks:

[Keep rebuttal used in LB #4]

4- Comment # 221 (by Heinz Lycklama)

Original comment:

The standard needs to support both TDD and FDD for both licensed and licensed-exempt bands. This makes it easier to use the same chipsets for various licensed and licensed-exempt bands. For example, some equipment suppliers for the UNII band wish to use both the 5.25 GHz and the 5.725 GHz bands. The most efficient way to use this spectrum is to use FDD.

Suggested remedy by original commenter:

Delete the sentence starting at line 53 in Section 6.2.7.7.2.1 "Systems in the licensed-exempt bands shall use TDD only."

Reason for Group's decision/resolution:

This necessitates addressing TDD/FDD co-existence problems in the license-exempt bands. From a chip perspective, it makes no difference. It would also lead to more interoperability issues. Further, with FDD in license-exempt bands, periodic DFS presents the challenge of switching frequencies on the Rx chain to check the Tx channel, during which the Tx chain must cease.

Proposed rebuttal:

In general we agree that the standard should support both TDD and FDD for both license and license-exempt bands for the same reason given by Heinz. But, there is an issue that the WG disagree with the comment where the FDD will not properly operate with DFS and the interference

avoidance in unlicensed channels that 802.11 members of the SEC had an issue can be an added problem.

Original Remedy Proposed

Delete the sentence starting at line 53 in Section 6.2.7.7.2.1 "Systems in the licensed-exempt bands shall use TDD only."

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

This background discussion is not addressed to the balloter.

Rebuttal proposed by Marks:

[Keep rebuttal used in LB #4]

5- Comment # 270 (by Tom Kolze)

Original comment:

The compliance with 802.16 allows for (at least) two separate systems, which do not interoperate. There are multiple PHYs, but a BS does not have to support both, or even a subset of both, and the SS does not have to support both, either. These are effectively two different standards, which means the group did not do its work. In some other standardization activities, wireless and otherwise, a related family of modulation formats was selected for the standard: one example is a standard using single carrier, with various, well-thought-out modulation constellations of varying bits per symbol, and FEC from a family with great commonality, such as Reed-Solomon with common field; another example is multi-tone (OFDM) with family of constellations and FEC family from a convolutional code with various puncturing. There is even an example now with two different U/S modulation types, but with the "SS-like" units supporting BOTH, so that the benefits of standardization are provided for the industry and the consumer. In short, there is a reason why IEEE says "one problem, one solution," and while families of techniques comprising toolboxes have proven great for standards now for years, i.e., "flexible PHY," disparate approaches, with no "inclusion strategy" at the SS and/or the BS that benefits the industry and/or consumers, is definitely not in the IEEE spirit.

Suggested remedy by original commenter:

Pick a standard, or develop an inclusion strategy that makes sense and shows the benefit to the industry of standardizing in common equipment multiple disparate solutions. DO NOT just have separate standards for separate systems, which is AT ODDS with IEEE policy for its standards.

Reason for Group's decision/resolution:

The standard has been reduced to define four major PHY configurations and a common MAC. Splitting the embodiments into separate documents is not permitted under the PAR. Furthermore, the 802.11 example is a bad one, since the various documents are logically a single document (and will eventually be united into a single physical document). A better solution is to name the embodiments. A good example is 10Base T and 100BaseT, both defined in IEEE standard 802.3.

Proposed rebuttal:

The WG group response is good enough. There is nothing wrong of having three applicable PHY specifications for wide range of frequency bands and wide range of applications.

See also response to comments #1 and #2.

Original Remedy Proposed

Pick a standard, or develop an inclusion strategy that makes sense and shows the benefit to the industry of standardizingin common equipment mulitple disparate solutions. DO NOT just have separate standards for separate systems, which is AT ODDS with IEEE policy for its standards.

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

The WG response is NOT good enough by any means. In fact, it is completely inappropriate, because:
(1) It argues why we shouldn't "split the embodiments into separate documents", though the balloter did NOT propose to do so.
(2) It argues that "the 802.11 example is a bad one," even though the balloter did NOT mention 802.11.

Rebuttal proposed by Marks:

The set of mode options has been reduced to the minimum acceptable to the WG, which believes that a variety of alternatives is required to support operation in the many regulatory and service environments in which the standard may be applied.

6- Comment # 476 (by Tom Kolze)

Original comment:

Dozens of TBDs, question marks (?), and blank entries over three pages.

Suggested remedy by original commenter:

These must be eliminated.

Decision of Group:

Accepted-Modified.

Resolution of Group:

Delete section 8.3.5.2.7.5.

Reason for Group's decision/resolution:

no specific changes suggested.

TBDs left after ballot 4a resolution, are in Table 204 and Table 205 (D2).

Proposed rebuttal:

Action: The working group has to eliminate all TBDs and Blank entries.

Original Remedy Proposed

(none)

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

The rebuttal is not addressed to the balloter.

Rebuttal proposed by Marks:

The comment has been accepted. All TBDs have been eliminated.

7- Comment # 491 (by Tom Kolze)

Original comment:

Too many disparate "standards." Pick one, either AL or BL, or develop an inclusion strategy (if possible) for SS and BS that justifies for the industry and the consumer the multiplicity of standards here, rather than simply giving the appearance that 802.16 could not adhere to the IEEE "one problem, one solution" mandate.

Decision of Group:

Rejected.

Reason for Group's decision/resolution:

4a: The standard has been reduced to define four major PHY configurations and a common MAC.

Proposed rebuttal:

IEEE "one problem, one solution" mandate is not that easy issue. As a WG after evaluations we have adopted three workable PHYs for a large frequency range, coverage, and wide range of applications sought by FRD. In addition, the standard must address a wide number of topologies and environments and unlike CABLE/DOCSIS standard, one size solution cannot fit all.

See also comments #1 and #2.

Original Remedy Proposed

(none)

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

This can best be addressed with a rebuttal identical to that of Comment 270.

Rebuttal proposed by Marks:

This comment is substantially the same as Comment 270.

The set of mode options has been reduced to the minimum acceptable to the WG, which believes that a variety of alternatives is required to support operation in the many regulatory and service environments in which the standard may be applied.

8- Comment # 535 (by Lars Lindh)

Original comment:

The intention of using a DL Frame prefix is not declared in the text and is not evident by itself. One purpose could be to get some information for the next burst a little earlier. Even this is questionable because almost the same kind of operations must be performed. The following kind of execution times for the different decoding phases can be foreseen:

FFT   256*8 cc   FFT-256 case

CC innercode   192*4 cc   192 symbols processed 4 times because of back-tracking and tail-biting

RS outercode   3*t + K cc   dependent on t=4 plus a constant usually a relative small number

de-interleaving   192 cc

To be able to get some intelligent value out of the DL Frame prefix we must at least do the FFT, CC inner decoding and de-interleaving. It is not much faster than if we do the whole stuff (FFT, CC innercode, RS, de-interleaving and digging in the map). Please note that the information element for the first burst comes in the first FEC codeword.

Suggested remedy by original commenter:

Delete the DL Frame Prefix from the FCH burst as it does not much speed up the process of knowing the modulation/coding and length of the next burst.

Decision of Group:

Rejected.

Reason for Group's decision/resolution:

Rate_ID is an essential parameter for decoding the DL-MAP, if the Rate_ID is not fixed (see D2, page 155, line 63).

Proposed rebuttal:

The WG has already given a good response.

Original Remedy Proposed

Delete the DL Frame Prefix from the FCH burst as it does not much speed up the process of knowing the modulation/coding and length of the next burst.

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

(none)

Rebuttal proposed by Marks:

[Keep rebuttal used in LB #4]

9- Comment # 638 (by Tom Kolze)

Original comment:

TBDs in this section must be eliminated.

Decision of Group:

Rejected.

Reason for Group's decision/resolution:

4a: TBDs are not yet resolved.

Proposed rebuttal:

Action: The working group has to eliminate all TBDs and Blank entries.

Original Remedy Proposed

(none)

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

The rebuttal is not addressed to the balloter.

Rebuttal proposed by Marks:

The comment has been accepted. All TBDs have been eliminated.

10- Comment # 928 (by Panyuh Joo)

Original comment:

Quasi-random Ranging Code Selection is necessary for OFDMA PHY. Quasi-random Ranging Code Selection has better benefit than Random selection for avoiding of collision in Bandwidth Request Ranging.

Suggested remedy by original commenter:

Refer to coming contribution.

Decision of Group:

Rejected.

Reason for Group's decision/resolution:

Current solution was deemed adequate in view of no simulation or other documentation on the superiority of the method suggested in the comment. Such documentation is invited.

Proposed rebuttal:

Need strong convincing proof by Panyu why WG should change the Ranging Code of OFDMA at this time.

Original Remedy Proposed

Refer to coming contribution.

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

The rebuttal is not addressed to the balloter.

Rebuttal proposed by Marks:

[Keep rebuttal used in LB #4]

11- Comment # 1069 (by Lars Lindh)

Original comment:

In WG letter ballot I submitted a technically binding comment 535 regarding the DL Frame Prefix. The comment was rejected by the group but did not contain any justification for the rejection. As I consider that the comment was not solved in satisfactory way I still have to disapprove of the DL Frame Prefix.

Decision of Group:

Rejected.

Reason for Group's decision/resolution:

See Comment 0535.

Proposed rebuttal:

The WG has already given a good response.

Original Remedy Proposed

(none)

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

(none)

Rebuttal proposed by Marks:

The WG acknowledges its initial failure to provide a technical rationale for the rejection of Comment 535. However, it believes that the current explanation is sound.

12- Comment # 1108 (by Panyuh Joo)

Original comment:

Add subsection 8.3.5.6.3.2.1 assignment of pilots.

The Nused used carriers in the UL are portioned into constant-location pilots, variable location pilots, and data subchannels like those in the DL, However, because a subchannel in the UL has

the number of pilots which is much smaller than those in the DL, they are not enough to do factions of pilots such as phase estimation and frequency offset estimation.

Decision of Group:

Rejected.

Reason for Group's decision/resolution:

The entire structure of the design would need to be redone to accommodate this request.

The pilots for each uplink user are used to estimate the channel parameters for that user alone. Note also that there is an uplink preamble (not like in the downlink).

Proposed rebuttal:

The WG has already given a good response.

Original Remedy Proposed

8.3.5.6.3.2.1 Assignment of Pilots

In addition to Permutaion base algorithm, Pilot's sharing algorithm among users are suggested.

Comments on Proposed rebuttal (IEEE C802.16a-02/52):

(none)

Rebuttal proposed by Marks:

[Keep rebuttal used in LB #4]

13- Comment # 0771 (by Shawn Taylor)

Note: This is officially a Disapprove comment, though it was not itemized as such in the SEC motion for Sponsor Ballot. The Chair believed that it had been satisfied and left it out, but the balloter did not submit his agreement.

Original comment:

Harmonize the two OFDMA modes.

Original Remedy Proposed

At a minimum have a single FFT size (2K). A single subcarrier permutation would also be desirable.

Decision of Group:

Accepted-Modified

Reason for Group's decision/resolution:

The FFT size has been harmonized at 2K.

Technical rationale for 2 subcarrier permutations has been presented.

Rebuttal proposed by Marks:

The two modes have been substantially harmonized. The balloter's minimum request (a 2048-point FFT for all OFDMA modes) has been met. Multiple subcarrier permutations will help combat inter-sector and inter-cell interference. Interoperability is not affected, since the OFDMA signal can be identified and synchronized to without knowing the permutation in use. After this synchronization is achieved, a simple scanning procedure can be used to identify the permutations. This scanning procedure is used only on initial network entry.