To:
Roger Marks
Chair, IEEE 802.16 Working Group
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Reference: TWG Inter-Operability Problem Reports (IOPRs 40838, 40990, 41119)

April 6, 2009

Subject: Liaison Statement to IEEE 802.16 WG on modifications to the IEEE 802.16 standard needed to support WiMAX certification.

Dear Dr. Marks,

In the course of development and validation of product certification test cases based on IEEE Std 802.16, the WiMAX Forum TWG has identified critical issues with the 802.16 specification that impede product interoperability. The WiMAX Forum TWG believes these issues require clarification and/or correction. TWG respectfully requests that IEEE 802.16:

- review the attached problem statements and/or WiMAX contemplated remedies for each one of the problem statements (see Annexes),
- develop a remedy for each one of the issues,
- and inform the WiMAX Forum TWG of the results of IEEE 802.16's actions on this matter.

Should IEEE 802.16 develop any specific remedy in response to the problems identified in Annex, and should these remedies be incorporated into the IEEE 802.16 standard, WiMAX Forum TWG would appreciate further communication giving specific details of the remedies including affected IEEE Std 802.16 sections.

Thank you very much for your attention to this matter of mutual importance.

Sincerely,

Sylvain Labonte, IEEE-IOPR Rapporteur

for

Wonil Roh and Vladimir Yanover
Chairs, WiMAX Forum Technical Working Group (TWG)

Annex A IOPR on General Clarifications on Ranging Regions (IOPR40990)

A.1 Interoperability Problem Statement

In Section 8.4.4.6 of Rev 2/D9, p. 726, l. 16, the definition of "*the sum of ranging allocations (in units of OFDMA symbols) shall be a multiple of 3 symbols…*" have left open the possibility of overlapping ranging allocations. Specifically,

- This definition does not provide needed clarification if overlapped ranging region is allowed? Is the BS allowed to allocate Initial ranging region and Periodic ranging region that overlaps in time?
- If Overlapping region is allowed, does the overlapped area included in the sum in order to be compliance to "*the sum of ranging allocations (in units of OFDMA symbols) shall be a multiple of 3 symbols". D*o we count the overlapped area once or twice?

In addition, from Section 8.4.7.4, it is noted that the ranging opportunity symbol(s) is allowed to be any ranging slot location within the ranging region allocation.

A.2 Possible Changes in the IEEE 802.16 Standards

[Modify Section 8.4.4.6 of P802.16Rev2/D9, page 726 line 18 as indicated:]

"…For UIUC = 12, the sum of ranging allocations (in units of OFDMA symbols) shall be a multiple of 3 symbols. ***If ranging regions overlap, the symbols are counted once towards the sum of the ranging allocations.***

b) The slot boundaries in all subchannels shall be aligned, i.e., if a slot starts in symbol k in any sub-channel, then no slots are allowed to start at symbols k + 1, k + 2 at any other subchannel. c) The number of UL symbols (excluding AAS preambles and Sounding zone (UIUC=13)) per zone shall be an integer multiple of slot duration.

Annex B IOPR on Data mapping for optional AMC zones with 2 transmit antennas in DL (IOPR40838)

B.1 Interoperability Problem Statement

The section 8.4.8.3.1.2.1 in Rev2/D9 specifies the allocation of data subchannels for STC optional AMC in the following paragraph:

For 2-antenna matrix A in 8.4.8.3.3 the bursts are required to have 6 symbol granularity and begin on a 6 symbol boundary. In the first stage the data is first mapped frequency-first to each slot, and frequency-first over the slots of the allocation as depicted in Figure 219. Then at the second stage matrix A encoding is performed over each pair of QAM symbols which were assigned to the same subcarrier index over two symbols.

It is not perfectly clear what is meant by *"bursts are required to have 6 symbol granularity and begin on a 6 symbol boundary"*. Also, it is not perfectly clear if data mapping is on slot or slot-pair basis given the constraint about 6 symbol granularity. The explicit definition corroborated with illustration is required to avoid different interpretations from rather ambiguous text.

B.2 Possible Changes in the IEEE 802.16 Standards

Modify the second paragraph in section 8.4.8.3.1.2.1 of Rev2/D9 as follows and add the figure:

For 2-antenna matrix A in 8.4.8.3.3 the bursts are required to have 6 symbol granularity and both begin and end on a multiple of 6 symbol boundary counting from the beginning of the zone. In the first stage the data is first mapped frequency-first to each slot, and frequency-first over the slots of the allocation as depicted in Figure 219. This implies that subchannels are allocated on slot by slot basis as indicated in Figure 1. As a result of the 6+6n symbol granularity required, all non-HARQ burst allocations and all HARQ sub-burst allocations of matrix A are rectangular. Then at the second stage matrix A encoding is performed over each pair of QAM symbols which were assigned to the same subcarrier index over two symbols. When 2-antenna matrix B is scheduled with 6+6n symbol per burst granularity (see section 11.8.3.5.5), the bursts are required to both begin and end on a multiple of 6 symbol boundary counting from the beginning of the zone. In case of matrix B with 6+6n symbol per burst granularity, all non-HARQ burst allocations and all HARQ sub-burst allocations are rectangular.

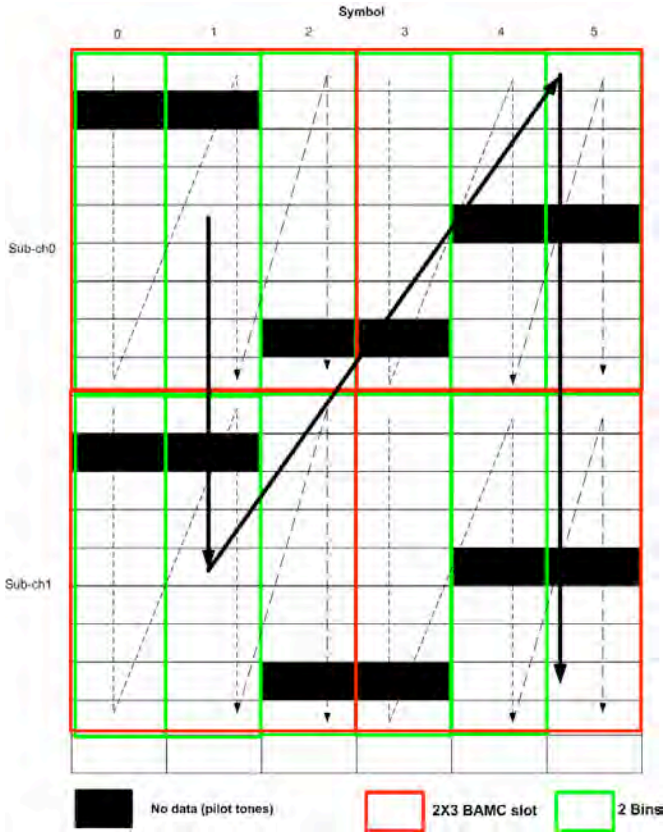

Figure 1: Illustration of data mapping rules.

Annex C IOPR on Formulas for HO CINR Averaging

C.1 Interoperability Problem Statement

In Rev2/D9 the equation for calculating the time average of HO CINR does not take into account the impact of non-uniformly distributed measurements. This absence of a correct formula leads to interoperability problems because it is impossible for a BS to know what formula the MS uses for averaging non-uniformly spaced samples. Consequently it is difficult to optimize HOs in the system.

C.2 Possible Changes in the IEEE 802.16 Standards

In Rev2/D9, Section 8.4.12.3, p. 1123:

- replace Eq. 156 by an equation identical to Eq. 158.
- Change text of lines 21-23 as follows:

> CINR[k] is a linear measurement of CINR (derived by any mechanism that delivers the prescribed accuracy) for message k, ~~and~~ αavg is an averaging parameter specified by the BS and n is the number of consecutive frames in which no measurement is made.