

To:
Roger Marks
Chair, IEEE 802.16 Working Group
rmarks@nextwave.com

Reference: Inter-Operability Problem Report Concerning UL Power Control

Date: Nov 8, 2008

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 Annex A problem statement and/or a WiMAX contemplated remedy for each one of the problem statements,
- 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.

The issues identified in Annex A impact interoperability of products currently under testing and deployment, and therefore time is of the essence and the WiMAX Forum TWG requests expeditious processing on this matter.

Should the IEEE 802.16 develop any specific remedy in response to a problem identified in Annex A, and should that remedy be incorporated into an open IEEE 802.16 Amendment or Revision project, the WiMAX Forum TWG would appreciate further communication giving specific details of the remedy including affected IEEE Std 802.16 document sections and the language of the likely remedy.

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)

Enclosure:

Annex A IOPR on General Clarifications of Uplink Power Control Operations

A.1 Interoperability Problem Statement

The purpose of this IOPR document is to provide needed operational clarifications into the current release of the IEEE 802.16 standard with respect to uplink power control.

A.2 Overview

A.2.1 Switching between power control modes

When the BS commands the MS to switch PC mode (using `PMC_RSP`, see section 6.3.2.3.59 of the standard) and the BS does not receive any reply from the MS (due to errors in reception of the MS response, or if no bandwidth is allocated to the MS), the following behavior is expected from the MS and BS:

- The MS should switch to the new state defined in `PMC_RSP`
- The BS should resend `PMC_RSP` until getting `PMC_REQ`, or until some number of retries is reached. The number of retries is BS vendor specific. A reference value for the maximal no. of retries (not including the first `PMC_RSP` message) is 2 (not including the first `PMC_RSP` message).

A.2.2 Power control after Scanning, sleep & idle

The following clarifications address the behavior of the MS after periods (frames) of sleep, idle and scanning periods.

- After a period caused by the MS being either in scanning or sleep modes, the MS should retain the last used power control mode.
- After a period caused by the MS being in idle mode, the MS should use closed loop power control mode upon completion of the initial ranging, i.e. after receiving the first answer from the BS (as is the case in initial network entry).

A.2.3 Averaging the Tx power reports

Equation 138d in 802.16e-2005, page 639 (which is now Eq. 191 in 802.16Rev2_D0) describes the averaging of the power report:

$$M(n) = L + NI + Offset_SS_{perSS} + Offset_BS_{perSS} \text{ (dB)}$$

$$M_{avg}(n) = 10\log(\alpha_{p_avg} \cdot 10^{M(n)/10} + (1 - \alpha_{p_avg}) \cdot 10^{(M_{avg}(n-1))/10})$$

It is hereby clarified that:

- For setting the condition for power report $M_{avg}(n)$, the power level should be averaged by the MS on an ongoing basis, i.e. using all frames, during availability periods. (Rather than use a gating function for updating the averaging only during frames where the MS transmits a report).

- The report itself should reflect the power level of the exact burst which carried the message and thus should be an instantaneous value (not averaged).

A.2.4 Power control mode during and after Handover

This section contains clarifications, to the “Initial power control mode at the target BS”. The following cases are to be distinguished:

- Non-coordinated HO or coordinated HO in which one of the parameters is missing (contention based using CDMA ranging) – The MS should maintain the power control mode in which it was before the handover, upon completion of the handover ranging, i.e. after receiving the first answer from the TBS.
- Coordinated HO (non-contention based using Fast_Ranging_IE) – The power control mode at the TBS should be that same as the power control mode at the SBS (regardless of whether it was CL or OL).

During HO ranging, i.e. following the first transmission of the first CDMA code until the completion of the ranging process, the MS should use the power correction term which may be included in the RNG-RSP message received from the BS. It is up to the specific implementation of MS vendors, to decide whether to use only the power correction term, sent by the BS (meaning that the MS is in a kind of “closed loop power control mode” during HO), or to also consider other internal measurements, e.g. of path loss changes, etc. (meaning that the MS maintains a kind of “open loop power control mode” during HO) for calculating the power of subsequent CDMA transmissions.

A.3 Possible Changes in the IEEE 802.16 Standards

The proposed changes in the IEEE standards are as follow:

A.3.1 Change 1

- Problem: When the BS commands the MS to switch PC mode and the BS does not receive any reply from the MS, BS and MS behaviour is not clear
- Suggested Remedy: Insert text from Section A.2.1 into Section 8.4.10.3 of Rev2/D7

A.3.2 Change 2

- Problem: Behavior of the MS after periods (frames) of sleep, idle and scanning periods is not clear
- Suggested Remedy: Insert text from Section A.2.2 into Section 8.4.10.3 of Rev2/D7

A.3.3 Change 3

- Problem: Equation 191 in 802.16Rev2_D0 is unclear
- Suggested Remedy: Insert text from Section A.2.3 into Section 8.4.10.3.2.1 of Rev2/D7

A.3.4 Change 4

- Problem: Initial power control mode at the target BS needs clarifications
- Suggested Remedy: Insert text from Section A.2.4 into Section 8.4.10.3.2.2 of Rev2/D7