Project	IEEE 802.16e Broadband Wireless Access Working Group <http://ieee802.org/16>	
Title	Zero headroom sounding zone mechanism	
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Re:	Call for contributions, IEEE P802.16e-2005 Sponsor Ballot	
Abstract	This document suggests changes in TGe Draft Document IEEE 802.16e-2005 to clarify the uplink transmit timing for initial ranging	
Purpose	Adopt into the current TGe working draft	
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Zero Headroom Power for sounding zone correction

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Background

In the current standard corrigenda 2 [1] a mechanism that discusses the UL power control with zero headroom transmissions conditions was suggested and accepted. However, an erroneous coupling between the sounding zone (UIUC 13) and all the other control burst profiles (UIUC = 0, 12,14) was introduced. The purpose of this contribution is to solve this problem and decouple the sounding zone transmissions in zero headroom conditions from all other UIUCs.

Proposed Remedy

The corr2 draft says that "In situations where the subcarrier power specified by power control mechanisms indicates that the transmit power for a given transmission would exceed the maximum transmit power for the specified MCS, the transmit power shall be limited to the maximum allowed. Regions defined by UIUC=0, 12, 13 and extended UIUC2=8 that do not overlap data allocations on any OFDMA symbol may be scaled independently of data allocations. UIUC 13 regions used for Sounding Zone allocations shall be scaled independently of data allocations and if such region contains multiple symbols, each symbol shall be scaled independently."

In this sense each zone (i.e., CQI+ranging, data, sounding) will have its unique P_{tone} depending on its widest allocation (i.e., the maximal number of subcarriers in that zone) where we consider the sounding symbol/symbols to behave like a separate zone although in practice these symbol/symbols are defined by the standard as the last symbol/symbols of a permutation zone. This means that in zero headroom scenarios, the sounding symbol (or symbols) which contains $N_{sounding,subcar}$ subcarriers per MS will scale the max available power $P_{\max}$ such that the per tone power will follow the following relation : $P_{tone,sounding} \quad P_{\max} / N_{sounding,subcar}$. According to the current text, the transmit power per tone of the CQI, ranging and HARQ-ACK regions has to be set to the same power as that of the sounding. However, the number of sounding subcarriers is different from the number of subcarriers allocated to either ranging, CQI, or HARQ-ACK and hence the power per tone should scale accordingly for each one of these UIUCs. To correct the problem, it is proposed to decouple the sounding zone power calculations from the power calculations in the CQI, ranging, and HARQ-ACK zones.

Proposed Text Changes

[Modify the text as followings on page 333 of IEEE 802.16e-Cor2-D1]

In the last sentence of the first paragraph of 8.4.10.3 change the text as follows:

UIUC 13 regions used for Sounding zone allocations shall be scaled independently of data allocations, ~~and~~ CQI, ranging and HARQ-ACK allocations and if such region contains multiple symbols, each symbol shall be scaled independently.

References

[1] IEEE Std 802.16e 2005/cor2-D1 (Corrigendum to IEEE Standard for Local and Metropolitan Area Networks)