Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>
Title	Mino Clarification for Uplink Channel Sounding
Date Submitted	2007-04-29
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Re:	Call for comments to Cor2/D1
Abstract	This document describes an editorial clarification to the cyclic shift index variable in the UL sounding Command IE.
Purpose	Approve and adopt in Cor2
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Clarification for UL Channel Sounding

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1/26/2007

Problem Statement

In the Uplink Channel Sounding methodology, there are two separability types for enabling the base station to separately estimate the uplink channel response from multiple mobile stations transmitting sounding waveforms within a sounding symbol interval. In decimation mode sounding, a mobile station will occupy every D^{th} subcarrier within the sounding allocation, where D is the decimation value specified in the UL sounding command IE. Each mobile is allocated a different decimation offset value d, where d ranges from 0 to D-1. In cyclic shift separability, each subscriber is assigned a different phase ramp that multiplies the underlying Golay sequence across frequency. There are a variety of ways of specifying the phase ramp for cyclic shift separability, and the current COR2/D1 draft has an ambiguity in terms of how this phase ramp is specified.

The UL sounding command IE in the COR2/D1 draft specifies a "Cyclic Time Shift Index m" that "Cyclically shifts the time domain symbol by multiples (from 0 to P-1) of N/P where N=FFT size and P=Max Cyclic Shift Index." Equation 109 specifies the MS-specific frequency-domain phase ramp, which acts in the time-domain to cyclically shift the time-domain symbol. Unfortunately, Equation 109 does not contain the variable "m". Instead, equation 109 contains the variable "n", which is described as "the assigned cyclic time shift index (*also from the sounding instructions*), which ranges from 0 to P-1" (emphasis added). Clearly an inconsistency is present given that the UL sounding command IE specifies m, but the text describing equation 109 specifies a value of n. This inconsistency also carries over into the description of the multi-antenna flag in the first paragraph in COR2/D1, which refers to the variable "m" which is assumed to be an integer that ranges from 0 to P-1.

Clearly, a remedy to this inconsistency is required. The proposed remedy is rather simple and makes no changes to the technical functionality of the UL Channel Sounding methodology. This remedy simply changes the variable used in the UL sounding command IE (and in a subsequent paragraph) to match the corresponding variable used in Equation 109. Note that Equation 109 is not modified by this remedy.

Suggested Remedy

[8.4.6.2.7 Optional Uplink Channel Sounding in TDD Systems]

[Table 315d – UL_Sounding_Command_IE()]

[Modify the row "Cyclic time shift index m" as follows:]

Syntax	Size	Notes
Cyclic time shift index ~~m~~ n	5 bits	~~Cyclically shifts the time domain symbol by multiples (from 0 to P −1) of N/P where N=FFT size, and P=Max Cyclic Shift Index~~ <u>Specifies a frequency-domain phase ramp to be multiplied to the Golay Sequence as shown in Equation 109. The value of n ranges from 0 to P-1.</u>

[Modify the first paragraph of page 300 of COR2/D1]

For CSIT capability A, the indices d or ~~m~~ n are associated with the first antenna of the MS. If Multi-Antenna Flag equals 1 then the *i*-th antenna of the MS corresponds to index $d + i - 1$ or to ~~m~~ *n* $+ i - 1$ respectively. If Multi-Antenna Flag equals 0 then only the first antenna performs sounding. The BS shall assign indices to different CIDs such that overlapping of indices is avoided. ~~Optional permutations for AAS and AMC subchannels~~