Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>	
Title	FFT size detection for OFDMA	
Date Submitted	2004-05-14	
Source(s)	Jose Puthenkulam Intel Corporation 2111 NE 25th Avenue, MS# JF3-206, Hillsboro, OR 97124	Voice: (503) 264-6121 jose.p.puthenkulam@intel.com
Re:	IEEE 802.16e D2 Draft	
Abstract	This contribution proposes changes to OFDMA PHY description in the 802.16e D2 Draft	
Purpose	To incorporate the changes here proposed into the 802.16e D2 draft.	
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.	
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.	
Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.	

FFT size detection for OFDMA

Jose Puthenkulam
Intel Corporation

Introduction

The current 802.16e D2 draft [1] requires the OFDMA 2k mode to be mandatory in section 8.4. Requiring all MSS to implement the 2k mode is very difficult requirement from a cost and complexity perspective. However if the intent is for MSS to always use 2k mode as a means of synchronizing to the network during initial network entry for all MSS, even from that perspective we feel its not necessary. Hence in this contribution we propose to remove this requirement.

Finding the channel bandwidth and FFT size

When an MSS enters a network for the very first time, it can use a search scheme to lookup all the supported channel bandwidths and FFT sizes to detect the channel to acquire on the DL. However such a scheme may incur some delay in channel acquisition. However this time may be tolerable as an MSS is entering the network for the very first time. For subsequent entries it can remember the last entered network channel widths and FFT sizes and optimize its search to quickly reacquire the same channel.

As this is purely an implementation optimization, further specification is not necessary in the 802.16e draft to support this feature. However it does obviate the need for a mandatory FFT size to be supported by all MSS. BS are free to choose the appropriate FFT size based on the channel widths deployed and the MSS will be dynamically able to acquire the DL through such a scanning and search as suggested here.

Changes Proposed

In section 8.4 replace the following text

“The mandatory OFDMA PHY mode that shall be supported by all SS is based on a 2048-FFT. Other FFT sizes may optionally be employed as well. These FFT sizes are scalable to the channel BW in which they are being used, i.e., 512- FFT for 5 MHz channel BW or less and 1024-FFT for 10 MHz channel BW or less.”

With the following text

“The OFDMA PHY mode based on at least one of the appropriate FFT sizes 2048, 1024, 512, 256 and 128 shall be supported based on the channel bandwidths supported. The Table 1 shows the recommended FFT sizes for the various channel bandwidths.

Channel Bandwidth	20 MHz and below	10 MHz and below	5 MHz and below	2.5 MHz and below	1.25 MHz and below
FFT size	2048-FFT	1024-FFT	512-FFT	256-FFT	128-FFT

Table 1: FFT size to channel bandwidth mapping

The MSS shall implement a scanning and search mechanism to detect the DL signal when performing initial network entry and this shall include dynamic detection of the FFT size and the channel bandwidth employed by

the BS. The exact algorithms employed are implementation specific but shall include optimizations for reducing channel acquisition times in network re-entry situations.
”

References

[1] IEEE P802.16e/D2, 2 April 2004