

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	PHY Requirement for Handoff Performance	
Date Submitted	2005-03-16	
	Dazi Feng Jason Hou Mary Chion Jing Wang Sean Cai Jun Han	dfeng@ztesandiego.com jhou@ztesandiego.com mchion@ztesandiego.com jwang@ztesandiego.com scai@ztesandiego.com jhan@ztesandiego.com
	ZTE San Diego Inc. 10105 Pacific Heights Blvd. San Diego, CA 92121 USA	Voice: 858-554-0387 Fax: 858-554-0894
Re:	Specify PHY Performance Requirement for Handoff for IEEE P802.16e/D6-2005	
Abstract		
Purpose	To specify PHY requirement to improve handoff performance	
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	<p>The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures (Version 1.0) <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, if there is technical justification in the opinion of the standards-developing committee and provided the IEEE receives assurance from the patent holder that it will license applicants under reasonable terms and conditions for the purpose of implementing the standard."</p> <p>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:r.b.marks@ieee.org> as early as possible, in written or electronic form, of any patents (granted or under application) that may cover technology that is under consideration by or has been approved by IEEE 802.16. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.</p>	

OFDMA PHY Requirement for Enhanced Handoff Performance

Dazi Feng, Jason Hou, Mary Chion, Jing Wang, Sean Cai, Jun Han

ZTE San Diego Inc. USA

1. Introduction

Current 802.16e standard emphasizes the mobile handoffs but did not specify enough physical layer requirements to enhance the handoff performance. In this contribution, we are proposing three PHY constrains for the BS network and MSS to enhance the handoff performance.

2. Background

In the current 802.16e standard, each BS can add independent buffering delays to the transmit path. The buffering delays will incur unspecified time differences among the neighboring BSs, when transmit frames go over-the-air.

The current standard places unprecedented burden on BS in handoff scheduling while MSSs stay in passive mode. BS needs to schedule each individual MSS to perform neighbor scanning, In PUSC deployment, there is no reason why MSS cannot perform neighbor cell scanning autonomously.

The following proposals aim at imposing reasonable constraints on 802.16e OFDMA devices (BS and MSS) to facilitate MSS in conducting handoffs. Specific improvements are

1. Specify the transmit frame timing on BS side to be aligned with 1pps system time at antenna ports and the requirements of equivalent alignment on MSS side at antenna ports. They will make radio frames between BSs and MSSs better structured and interference between neighbor cells reduced.
2. Further more, by constraining MSS to lock its epoch time upon the ranging process and track on the earliest arrival path, the MSS uplink timing is better behaved. Therefore, “ranging” handshake is no longer needed during the handoff and the frequency of periodic ranging can be greatly reduced therefore the success rate of CDMA based ranging request is highly improved.
3. By allowing MSS to initiate neighbor cell scanning, BS scheduler is freed up from managing the neighbor cell scanning of hundreds of MSSs. Updating the neighbor cell list shall be done by MSS autonomously and BS shall not have to dictate when and how MSS need to perform neighbor cell scanning.

3. Specific Text Changes

[Modify section 8.4.12.2 as follows]

8.4.12.2 Transmitter spectral flatness

[8.4.12.3 Transmitter reference timing accuracy](#)

At the BS, the transmitted downlink radio frame shall be time-aligned with the 1pps timing pulse (8.4.10.1.2). The start of the preamble symbol, excluding the CP duration, shall be time aligned with 1pps timing pulse when measured at the antenna port.

At the MSS, upon close-loop adjustments of transmit and receive timings from BS through CDMA ranging methods during network entry and periodic ranging, the MSS obtains the system time reference. Thereafter the MSS shall maintain the relative time reference when measured at the antenna port.

[Modify section 8.4.13.1 as follows]

8.4.13.1 OFDMA PHY requirements for enhanced handoff performance

8.4.13.1.1 Receiver sensitivity

8.4.13.1.2 MSS uplink transmit time tracking accuracy

With the time reference MSS maintained in 8.4.12.3, MSS shall autonomously adjust uplink transmit timing according to the timing advances and retards of the detected downlink earliest arrival path in the preamble symbol. The autonomous timing reference shall be tracked at antenna port without BS close-loop timing control.

At the MSS, the transmitted radio frame shall be time-aligned with the network specified uplink frame boundary. At zero timing advance and retard setting, the start of the first uplink data symbol, excluding the CP duration, shall be time aligned with the specified uplink frame boundary relative to the downlink arrival time when measured at the antenna port without BS close-loop control.

8.4.13.1.3 MSS autonomous neighbor cell scanning

If a MSS supports FBSS/SHO capability as defined in section 11.7.11, the MSS shall support autonomous neighbor cell scanning procedure according to the following. The MSS may also perform normal scanning procedures as defined in section 6.3.20.1.2.

For autonomous scanning procedure, the MSS shall perform neighbor cell scanning via preamble detection for neighbor cells in the same carrier frequency. The MSS shall maintain the signal quality database for neighbor cells without being instructed by the BS.

References:

[1] IEEE P802.16-REVd/D6-2004 Draft IEEE Standards for local and metropolitan area networks part 16: Air interface for fixed broadband wireless access systems