

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	Clarifications and fixes for OFDMA initial ranging procedures	
Date Submitted	2005-07-14	
Source(s)	Cory Modlin, Brian Johnson Texas Instruments	Voice: 301-515-3735 bfjohnson@ti.com
Re:	P802.16e/D9	
Abstract	Modifications to the initial ranging SS response to the RNG-RSP initial ranging procedures are proposed to fix high probability of failure of initial ranging procedure and reduce base station ranging computation complexity.	
Purpose	To provide clarifications and fixes to initial ranging procedures	
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 >.	

Clarifications and fixes for OFDMA initial ranging procedures

Cory Modlin, Texas Instruments

Brian F. Johnson, Texas Instruments

1. Introduction

In the current draft text (802.16e/D9) (6.3.10.3.1), after receiving a RNG-RSP with status "continue," the SS shall continue ranging in the initial ranging region using codes from the periodic ranging domain. This is good in that it allows the BS to recognize an SS that has already received at least one RNG-RSP message. However, it means that we must be able to detect ranging codes from both the initial and periodic ranging code domains which adds complexity, and it means there is no way for the SS to enter the periodic ranging region before the completion of initial/handover ranging.

We propose instead that the BS send the SS a specific ranging code in the RNG-RSP message. This code shall be outside of the initial ranging domain. The SS shall use this code for the next ranging transmission. The SS still uses random backoff making it extremely unlikely that two SSs that previously collided and used the same CDMA code will be confused again.

After receiving feedback, we have modified the proposal so that the BS can specify, in the RNG-RSP message, both the code to use and the ranging region to use to the SS for the subsequent transmission. This allows the BS to manage the use of the codes allocation and the ranging regions, as well as to decide how many adjustments to make to the SS in each region before moving to another region.

2. References

802.16e/D9

3. Suggested Changes

The changes outlined in red are text changes from the original contribution. The text changes in green are the changes made between the original version and the final version of this contribution.

Make the following changes to the text of 802.16e-D9 :

Page 151 line 56 insert the following bracketed text:

{

6.3.10.3.1 Contention based initial ranging and automatic adjustments

[Make the following changes to bullet four of section 6.3.10.3.1]

– Upon receiving a Ranging Response message with continue status, the SS shall continue the ranging process as done on the first entry ~~except~~ with ~~the~~ ranging code, ~~randomly~~ ranging method, ~~randomly~~ chosen ~~from the Periodic Ranging domain~~ and corrections specified in the RNG-RSP message. ~~This~~

~~ranging code shall not be within the initial ranging domain.~~

}

Page 151, line 33 insert the following bracketed text {

[Make the following changes to paragraph 11 of section 6.3.9.5.1]

For OFDMA, the SS shall send a CDMA code at a power level below $P_{TX_IR_MAX}$, measured at the antenna connector. If the SS does not receive a response, the SS shall send a new CDMA code at the next appropriate Initial Ranging transmission opportunity ~~at one step higher~~ **and adjust its** power level. If the SS receives a RNG-RSP message containing the parameters of the code it has transmitted and status continue, it shall consider the transmission attempt unsuccessful but implement the corrections specified in the RNG-RSP and issue ~~another~~ **the** CDMA code, **and in the ranging method specified in the RNG-RSP message** after the appropriate backoff delay. If the SS receives an UL-MAP containing a CDMA allocation IE with the parameters of the code it has transmitted, it shall consider the RNG-RSP reception successful, and proceed to send a unicast RNG-REQ on the allocated BW. More details on this procedure can be found in 6.3.10.3.

}

Page 524 line 14 insert the following bracketed text

{

[Change table 369 as indicated:]

Table 369 – OFDMA – specific RNG-RSP message encodings

Name	Type	Length	Value

Ranging code attributes	150	-4 5 6	<p><u>Bits 42-47- reserved.</u></p> <p><u>Bits 40-41 – Used to indicate the ranging method that the SS shall use during its next ranging transmission. Applies only when the status is “continue”. The values are coded as follows:</u></p> <p><u>0b00: use Initial Ranging over two symbols</u></p> <p><u>0b01: use Initial Ranging over four symbols</u></p> <p><u>0b10: use Periodic Ranging over one symbol</u></p> <p><u>0b11: use Periodic Ranging over three symbols</u></p> <p>-</p> <p><u>Bits 39:32 – Used to indicate the ranging code index that the SS shall use during its next ranging transmission. Applies only when the status is “continue.” This ranging code shall fall outside of the initial ranging code domain.</u></p> <p>Bits 31:22 – Used to indicate the OFDM time symbol reference that was used to transmit the ranging code.</p> <p>Bits 21:16 – Used to indicate the OFDMA subchannel reference that was used to transmit the ranging code.</p> <p>Bits 15:8 – Used to indicate the ranging code index that was sent by the SS.</p> <p>Bits 7:0 – The 8 least significant bits of the frame number of the OFDMA frame where the SS sent the ranging code.</p>
-------------------------	-----	--------	--

}