Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>
Title	Reply to Comment 118 Fix for OFDMA Initial Ranging
Date Submitted	2005-07-19
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Re:	IEEE P802.16-2004/Cor1/D3
Abstract	The current proposed text describes a SS procedure to receiving RNG-RSP that will fail to work sufficiently often that the procedure needs to be fixed.
Purpose	This is a suggested modified remedy for comment 118 to fix OFDMA initial ranging
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Reply to Comment 118 Fix for OFDMA Initial Ranging

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1. Introduction

This contribution is a reply to comment 118 outlining issues with the proposed text and outlining an alternative remedy. It is important to also note that the text discussed here is already inconsistent with 802.16e/D9 and so this comment will also attempt to remove that inconsistency together with another comment in 802.16e which is associated with contribution 802.16e-05/338.

According to the current draft text (IEEE P802.16-2004/Cor1/D3) (Section 6.3.10.3.1), after receiving a RNG-RSP with status "continue," the SS shall continue ranging in the PERIODIC ranging region using codes from the INITIAL ranging domain. There are three issues with this:

1. The periodic ranging region contains a normal cyclic prefix which means the phase is not continuous between symbols and there is very little tolerance for a symbol timing offset. The initial ranging attempt is done with substantial power backoff and as a result the initial timing offset estimates may not be accurate enough.
2. Following the procedure currently outlined in IEEE P802.16-2004/Cor1/D3, this implies that in the periodic ranging region, we need to detect codes from both the periodic and initial ranging domain. This increases the complexity
3. This text is potentially inconsistent with the text in section 6.3.9.5.1, paragraph 11, page 176 which implies that the SS shall send another CDMA code at the next appropriate initial ranging opportunity.

The remedy proposed in comment 118 does not properly address the issues we have raised. Even with the symbol repeated, the cyclic prefix means that there is a discontinuity between OFDMA symbols. This means that we must be precisely aligned in time in order to receive the symbol without distortion.

We believe that the SS should continue ranging in the initial ranging region rather than in the periodic ranging region. Furthermore, so that the BS knows which SSs have already received a RNG-RSP message and to control a state machine, we propose that a specific ranging code that falls outside the initial ranging domain shall be indicated by the BS in the RNG-RSP message and used by the SS during its next ranging attempt.

After receiving some feedback on this contribution, we would like to modify the proposal to allow the BS to specify in the RNG-RSP to the SS both the ranging method and the ranging code for the SS to use on the next ranging transmission. This allows the BS to do two things. First, it allows the BS to manage the allocation of codes to ranging regions associated with different ranging methods. It further allows the BS to choose how many iterations of each ranging method to make before allowing the SS into the system.

2. References

IEEE 802.16-2005/Cor1/D3

3. Suggested Changes

Make the following text changes to IEEE P802.16-2004/Cor1/D3:

Change the paragraph starting on Page 53 line 20 to read as follows:

- 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, ranging method, ~~randomly chosen from the Initial Ranging domain sent on the Periodic Ranging region~~ and corrections specified in the RNG-RSP message~~. This ranging code shall not be within the initial ranging domain~~.

Page 45 line number 25 through 30 should be replaced by the following bracketed text

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Change the eleventh paragraph as indicated:

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 a~~n~~ 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.

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Page 54 lines 29 to 33, change to read as follows:

<---------Ranging Code-------	Transmit ~~randomly selected Periodic~~ the Ranging code specified in the RNG-RSP message, in a randomly selected Ranging Slot from an available Ranging Region that has the same ranging method as specified in RNG-RSP message.

Page 187 line 40 insert the 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	Bits 42-47- reserved. 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: 0b00: use Initial Ranging over two symbols 0b01: use Initial Ranging over four symbols 0b10: use Periodic Ranging over one symbol 0b11: use Periodic Ranging over three symbols 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.~~ Bits 31:22 – Used to indicate the OFDM time symbol reference that was used to transmit the ranging code. Bits 21:16 – Used to indicate the OFDMA subchannel reference that was used to transmit the ranging code. Bits 15:8 – Used to indicate the ranging code index that was sent by the SS. Bits 7:0 – The 8 least significant bits of the frame number of the OFDMA frame where the SS sent the ranging code.

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