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Re:	IEEE P802.16REVd/D5-2004	
Abstract	Clarification on ambiguities on the size of the initial ranging burst in OFDM.	
Purpose	Adopt changes.	
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Deterministic Initial Ranging Burst Size in OFDM

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1. Introduction

IEEE 802.16-2004 has some imprecision relative to the size of the initial ranging request and whether the SS is supposed to send just the number of symbols necessary for a RNG-REQ message or supposed to transmit using stuffing during the entire size of an opportunity?

1.1. Size of the initial RNG-REQ message

The initial RNG-REQ has a variable length. In OFDM, the smallest RNG-REQ packet is 23 bytes, taking into account the mandatory CRC. It fits in 4 OFDM symbols.

However, there is an optional TLV (AAS broadcast capability) that may add 3 bytes to the RNG-REQ message. This makes the RNG-REQ message 27-bytes longs or 5 OFDM symbols.

Moreover, nothing in the specification prevents an SS to add other TLVs in the RNG-REQ. It happens with SC/SCa PHY but it is also possible in future extensions of the standard, like all the RNG-REQ TLVs related to mobility introduced in 802.16e. These extra TLVs could also be special vendor-specific TLVs or even Ranging Anomalies although the spec writes that it "may be included in the RNG-REQ message after the SS has received an RNG-RSP addressed to the SS:"

Because of this imprecision, the BS can not determine easily the size of the RNG-REQ message and consequently the size of the initial ranging burst. If not fixed, this would cause interoperability issues if the BS expects a burst too small compared to the actual burst sent by the SS. The SS would not enter the network.

1.2. Size of the initial RNG-REQ burst

There is also an ambiguity on the size of the initial ranging burst.
In IEEE802.16-2004, there is a statement (page 450, line 28) that requires the SS to transmit during an UL allocation. "*An SS shall transmit during the entirety of all of its UL allocations, using the standard padding mechanism (6.3.3.7) to fill allocations if necessary.*"
Without any restriction, it also applies to initial ranging contention opportunities and bandwith request contention opportunities. This sentence is valid for BW contention TOs, but not for IR contention TOs.

We should add a restriction in the spec that it does not apply to IR contention TOs.

This is especially important because there is another problematic sentence in the description of the "Ranging Request Opportunity Size" UCD TLV: "Size (in units of PS) of PHY bursts that an SS may use to transmit a RNG-REQ message in a contention ranging request opportunity. The value includes all PHY overhead as well as the maximum SS/BS round trip propagation delay."

This sentence, along with the previous one, seems to require the SS to transmit its PHY burst during the whole IR TO.
This ambiguity is serious because the SS is not yet synchronized with BS. Should the SS apply this requirement blindly, its initial ranging burst would collide with burst sent in the allocations following the initial ranging opportunities.

1.3. Proposed Solution

The simplest solution is to have a TLV in the UCD to specify the burst size expected by the BS. This is very important because the size of the IR TO (as described in the UCD) takes into account the max supported round trip delay and gives no indication of the maximum burst size supported inside this TO.
The easiest fix is to add "ranging request burst size" TLV .

This contribution amends changes made in IEEE P802.16-2004/Cor1/D1.

2. Text changes

[Insert the following text page 38, line 40]

Change fourth paragraph as indicated:

With the OFDM PHY, a PHY burst, either a downlink PHY burst or an uplink PHY burst, consists of an integer number of OFDM symbols, carrying MAC messages, i.e., MAC PDUs. To form an integer number of OFDM symbols, unused bytes in the burst payload may be padded by the bytes 0xFF. Then the payload should be randomized, encoded, and modulated using the burst PHY parameters specified by this standard. If an SS does not have any data to be transmitted in an UL allocation, the SS shall transmit an UL PHY burst containing a bandwidth request header as defined in Figure 20, with BR = 0 and its basic CID. If the allocation is large enough, an AAS enabled SS may also provide an AAS Feedback Response (AAS-FBCK-RSP) message (6.3.2.3.40). An SS shall transmit during the entirety of all of its UL allocations, using the standard padding mechanism (6.3.3.7) to fill allocations if necessary. In the case of contention initial ranging allocations, the UL allocation size is the "Contention ranging request burst size" TLV as specified in the UCD.

[Insert the following text page 127 , line 50]

Delete the entry with 'Ranging request opportunity size' under the Name column from Table 349.

Insert the following entry to tables 350, 351

Contention ranging request opportunity size	XX	2	Size (in units of PS) of the transmission opportunity that an SS may use to transmit a RNG-REQ message in a contention ranging request opportunity. The value includes all PHY overhead as well as the maximum SS/BS round trip propagation delay
Contention ranging request burst size	XX	2	Size (in units of PS) of PHY bursts that an SS shall use to transmit a RNG-REQ message in a contention ranging request opportunity.

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Insert the following entry to tables 352

Contention ranging request opportunity size	XX	2	Size (in unit of PS) of the transmission opportunity that an SS may use to transmit a RNG-REQ message in a contention ranging request opportunity. The value includes all PHY overhead as well as the maximum SS/BS round trip propagation delay
Contention ranging request burst size	XX	2	Size (in OFDM symbols) of PHY bursts that an SS shall use to transmit a RNG-REQ message in a contention ranging request opportunity. Default value: 4