Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Text For Implementation of Comment 561**
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Re:	IEEE 802.16 Working Group, Letter Ballot #4, IEEE P802.16a/D1-2001
Abstract	This contribution details changes proposed to IEEE 802.16a/D1-2001 Draft Standard. The purpose of the changes is to improve performance of the Bandwidth Request mechanism in OFDM Mode A_L..
Purpose	The information should be considered as a resolution to comment 561 pertaining to Letter Ballot #4 on IEEE P802.16a/D1-2001.
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Text For Implementation of Comment 561

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1. Introduction

This contribution details changes proposed to IEEE 802.16a/D1-2001 Draft Standard. The purpose of the changes is to improve performance of the Bandwidth Request mechanism in OFDM Mode A_L.

This contribution is the result of discussions with other members of Task Group 3 and supercedes section 6 of contribution IEEE C802.16a-02/12.

2. Text

On pg. 169, add this text to the end of clause 8.3.5.3.3.1 Frame Structure:

There may be two types of REQ Regions in a frame. These two types are REQ Region-Full and REQ Region-Focused.

In a REQ Region-Full, each Transmit Opportunity shall consist of three OFDM symbols.

In a REQ Region--Focused, each Transmit Opportunity shall consist of two OFDM symbols. Each Transmit Opportunity shall be indexed by consecutive Transmit Opportunity Indices. The first occurring Transmit Opportunity shall be indexed 0.

On pg. 173, in Table 202, OFDM Mode A_L>UIUC Values, change the name "contention interval" ***or*** "REQ Region" ***(inserted by comment 551 or comment 552) to*** "REQ Region-Full".

Also in Table 202, add a line with a new code named "REQ Region-Focused".

In the base document IEEE P802.16/D4-2001, on pg. 325, in clause 11.4.1.6 Common Encodings>SS Capabilities Encodings>Bandwidth Allocation Support, in the last line of the table, change "bit #2-7: reserved, shall be set to zero" *to* "bit #3-7: reserved; shall be set to zero".

Also in this same table, just above the changed line, add the following two lines:

Table 1: Row to be added to the table in clause 11.4.1.6

Type	Length	Value	Scope
t		bit #2=1: Capable of focused contention bit #2=0: Not capable of focused contention	

On pg. 177, change section 8.3.5.3.3.7.2 , OFDM Mode A_L>Bandwidth Requesting to read as follows:

8.3.5.3.3.7.2 Bandwidth Requests

This section describes the procedure to be followed by a SS in order to effect a bandwidth request.

8.3.5.3.3.7.2.1 Parameter Selection

The SS shall examine the UL_MAP message for a future frame and choose a future REQ Region during which to make its request. If the BS returned "on" in bit 2 of its SBC-RSP message during SS initialization, and if the SS is capable of focused contention, it may choose either a REQ Region-Full or REQ Region-Focused. Otherwise, it must choose a REQ Region-Full.

The SS shall also choose, at random with equal probability, a specific Transmit Opportunity from within this REQ Region.

If the chosen REQ Region is a REQ Region-Focused, the SS shall also choose, at random with equal probability, a *contention code* from Table 2 and similarly a *contention channel* from Table 2. The indices {-100 to +100} in the body of Table 3 refer to the subcarrier indices as defined in clause 8.3.5.3.3.5.

Table 2: Contention Codes

Contention Code Index	bit0	bit1	bit2	bit3
0	1	1	1	1
1	1	-1	1	-1
2	1	1	-1	-1
3	1	-1	-1	1
4	-1	-1	-1	-1
5	-1	1	-1	1
6	-1	-1	1	1
7	-1	1	1	-1

Table 3: Contention Channels

Contention Channel Index	subcarr0	subcarr1	subcarr2	subcarr3
0	-100	-50	+1	+51
1	-99	-49	+2	+52
2	-98	-48	+3	+53
...	...	...	...	...
k	k-100	k-50	k+1	k+51
...	...	...	...	...
48	-52	-2	+49	+99
49	-51	-1	+50	+100

8.3.5.3.3.7.2.2 Full Contention Transmission

If the chosen REQ Region is a REQ Region-Full, the SS shall transmit the preamble as defined in clause 8.3.5.3.3.9, followed by a Bandwidth Request MAC Header as defined in clause 6.2.2.1.2.

8.3.5.3.3.7.2.2 Focused Contention Transmission

If the chosen REQ Region is a REQ Region-Focused, after choosing its four parameters, the SS shall transmit, during the chosen Transmit Opportunity in the chosen frame, four subcarriers {subcarr0, subcarr1, subcarr2, subcarr3} which comprise the chosen contention channel. The amplitude of all other subcarriers shall be zero.

During both OFDM symbols, the amplitude of each of the four subcarriers shall be boosted somewhat above its *normal* amplitude, i.e. that used during a non-contention OFDM symbol, including the current power-control correction. The boost in dB shall equal the value of the Focused Contention Power Boost parameter in the current Uplink Channel Descriptor (UCD).

During the first OFDM symbol of the Transmit Opportunity, the phase of the four subcarriers is not specified.

During the second OFDM symbol of the Transmit Opportunity, the phases shall depend on the corresponding bit in the chosen contention code, and the phase transmitted during the first OFDM symbol on the same subcarrier. If the code bit is +1, the phase shall be the same as that transmitted during the first OFDM symbol. If the code bit is -1, the phase shall be inverted, 180 degrees with respect to the phase transmitted during the first OFDM symbol.

8.3.5.3.3.7.2.3 Capability Options

All SS shall be capable of the Full Contention Transmission. Capability of the Focused Contention Tranmission is optional.

On pp. 29-30, add the following text to the end of clause 6.2.2.3.6, Ranging Response Message:

The following parameters shall be included in the RNG-RSP message, when and only when the message is in response to a focused contention Bandwidth Request as defined in clause 8.3.5.3.3.7.2.2:

Transmit Opportunity Index:
> Index number of the the Transmit Opportunity that was used in the Bandwidth Request which this message is responding to.

Contention Channel Index:
> Index number of the the Contention Channel which was used in the Bandwidth Request which this message is responding to.

Contention Code Index:
> Index number of the the Contention Code which was used in the Bandwidth Request which this message is responding to.

On pg. 223, append the following rows to Table 233, RNG-RSP Messages in Section 11.1.4:

Table 4—Rows to Be Added To Table 233

Name	Type	Length	Value
Transmit Opportunity Index	18	2	The Transmit Opportunity Index of the Bandwidth Request which is being responded to, as described in clause 8.3.5.3.3.7.2.1.
Contention Channel Index	19	1	Used to indicate the Contention Channel Index of the Bandwidth Request which is being responded to, as described in clause 8.3.5.3.3.7.2.1.
Contention Code Index	20	1	Used to indicate the Contention Code Index of the Bandwidth Request which is being responded to, as described in clause 8.3.5.3.3.7.2.1.
Contention Frame Number	21	1	The eight least significant bits of the frame number in which the Bandwidth Request being responded to was received. See clause 8.3.5.3.3.7.2.

On pg. 220, append the following row to Table 230, UCD Burst Profile Encoding, in Section 11.1.2:.

Table 5: Row To Be Added To Table 230

Name	Type	Length	Value
Focused Contention Power Boost	19	1	The power boost in dB of focused contention subcarriers, as described in clause 8.3.5.3.3.7.2.2