Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Inconsistent Definition of Downlink Preamble
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Re:	Response to the call for contributions to IEEE Standard 802.16-2004, IEEE 802.16maint-04/01, 2004-08-04. ~~Header error fix to~~Revise solution to IEEE 802.16maint-04/30r1.
Abstract	In downlink ,preamble number per segment described in section 8.4.6.1.1 is different from Table 307 in IEEE 802.16D5
Purpose	To incorporate the text modification proposed in this contribution into IEEE 802.16REVd standard.
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Inconsistent Definition of Downlink Preamble

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1. Introduction

In the current 802.16D5 standard draft, preamble number of a segment in ***section 8.4.6.1.1*** is not consistent with Table 307 in ***section 8.4.6.1.1***.

In ***section 8.4.6.1.1***, it is said:

"The preamble carrier-sets are defined using the following formula:

$$PreambleCarrierSet_n = n + 3 \cdot k \qquad (105)$$

where:

PreambleCarrierSet$_n$ specifies all subcarriers allocated to the specific preamble
n is the number of the preamble carrier-set indexed 0...2
k is a running index 0...576
Each segment uses 2 types of preamble out of the 6 sets in the following manner:
Each segment uses a preamble composed of a carrier-set out of the 3 available carrier-sets in the following manner (in case of segment 1 the DC carrier will not be modulated at all and the appropriate PN will be discarded, therefore DC carrier shall always be zeroed, for segment 2 the last carrier shall not be modulated).

- Segment 0 uses preamble carrier-set 0
- Segment 1 uses preamble carrier-set 1
- Segment 2 uses preamble carrier-set 2**"**

That is :

in segment 0,there are 577 preamble subcarriers
in segment 0,there are 576 preamble subcarriers (include DC carrier)
in segment 0,there are 576 preamble subcarriers

But in Table 307, preamble modulation series number per segment is 568.

This is not consistent with the definition given in ***section 8.4.6.1.1.***

Moreover, in ***section 8.4.6.1.1,*** in fact, for segment 1 the last carrier is 1729 and it also shall not be modulated. Therefore, it should be **"** for segment 1 and segment 2, the last carrier shall not be modulated**".**

2. The Solution

Option 1:

Increase the length of the sequences in Table 307 to 577 bits. One possible way to modify sequences in Table 307 is to concatenating a small binary sequence of length 9 bits long, such that the concatenated PN sequence has the correct length and yet maintaining low PAPR.

Option 2:

Specify zero modulation on the undefined (gap) region.

3. Proposed Text

[*Modify the following text to section* ***8.4.6.1.1Preamble***]

=== Start text changes ===

The preamble carrier-sets are defined using the following formula:

$$PreambleCarrierSet_n = n + 3 \cdot k \qquad (105)$$

where:

PreambleCarrierSet$_n$ specifies all subcarriers allocated to the specific preamble
n is the number of the preamble carrier-set indexed 0...2
k is a running index 0...576
Each segment uses 2 types of preamble out of the 6 sets in the following manner:

Each segment uses a preamble composed of a carrier-set out of the 3 available carrier-sets in the following manner (in case of segment 1 the DC carrier will not be modulated at all and the appropriate PN will be discarded, therefore DC carrier shall always be zeroed, for segment 1 and 2**,** the last carrier shall not be modulated).

- Segment 0 uses preamble carrier-set 0
- Segment 1 uses preamble carrier-set 1
- Segment 2 uses preamble carrier-set 2

=== End text changes ===

[*Modify the Table 307in section **8.4.6.1.1Preamble***]

Option 1:

Modify the Table 307 by post pending sequence (−1 1 −1 −1 −1 −1 −1 1 1) to all entries in Table 307 so that the sequence length is 577. Simulation shows the maximum PAPR for the modified sequences of length 577 bits is 5.47dB.

=== Start text changes ===

Append the sub-sequence

(−1 1 −1 −1 −1 −1 −1 1 1)

to all entries in Table 307 so that the sequence length is 577.

=== End text changes ===

Option 2:

=== Start text changes ===

The PN series modulating the pilots are defined in Table 307. The series modulated depends on the segment used and IDcell parameter. The defined series shall be mapped onto the preamble subcarriers in ascending order. Table 307 includes the PN sequence in an Hexadecimal format, the value of the PN is obtained by converting the series to a binary series (Wk) and starting mapping the PN from the MSB of each symbol to the LSB (0 mapped to +1 and 1 mapped to -1, for example for Index=0, segment =0, Wk = 110000010010..., and the mapping shall follow: -1 -1 +1 +1 +1 +1 +1 -1 +1 +1 -1 +1 ...) ~~.~~. The undefined bits in Table 307 when mapping using (105) shall be zero modulated.

=== End text changes ===