Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**	
Title	**Text and Equations To Specify The OFDM/OFDMA Signal**	
Date Submitted	**2002-02-23**	
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Re:	IEEE 802.16 Working Group, Letter Ballot #4, IEEE P802.16a/D2-2002	
Abstract	In the current draft of IEEE 802.16a, we spend many pages explaining what gets modulated onto the OFDM subcarriers, but we do not explain what is a subcarrier and how it is related to the assigned center frequency. This contribution provides text to correct the situation.	
Purpose	The information should be considered in resolving comments to IEEE P802.16a/D2-2002.	
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Text and Equations To Specify The OFDM/OFDMA Signal

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1. Introduction

In the current draft of IEEE 802.16a, we spend many pages explaining what gets modulated onto the OFDM subcarriers, but we do not explain what is a subcarrier and how it is related to the assigned center frequency. This contribution provides text to correct that situation.

2. Added Clause Explicitly Describing The Transmitted Signal

8.3.5.2.3.3 Transmitted Signal

Equation (1) specifies the transmitted signal voltage to the antenna, as a function of time, during any OFDM symbol.

$$s(t) = Re\left\{ e^{j2\pi t f_c t} \sum_{\substack{k = -N_{used}/2 \\ k \neq 0}}^{N_{used}/2} a_k \cdot e^{j2\pi k \Delta f (t - T_g)} \right\} \quad (1)$$

where

t = time, elapsed since the beginning of the subject OFDM symbol, with $0 < t < T_S$.

a_k = a complex number; the data to be transmitted on the carrier whose frequency offset index is *k,* during the subject OFDM symbol. It specifies a point in a QAM constellation.

T_g = guard time

T_S = OFDM symbol duration, including guard time

Δf = carrier frequency spacing

3. Revision of Clause 8.3.5.5.3 Including Table 212

8.3.5.5.3 Parameters of Transmitted Signal

The parameters of the transmitted OFDM signal, transmitted as in 8.3.5.2.3.3, are given in Table 1.

Table 1— Parameters of Transmitted OFDM Signal

Parameter	Value
N_{FFT}	256
N_{used}	200
$F_S/(BW)$	7/6
Number of Lower-Frequency Guard Carriers	27
Number of Higher-Frequency Guard Carriers	28
Frequency Offset Indices of Guard Carriers	-128, -127, ... , -101, +101, +102, ... , +127
Frequency Offset Indices of BasicConstantLocationPilots	-84,-60,-36,-12,12,36,60,84

4. Addition to clause 8.3.5.6.3

In the sequel, carriers are identified by a carrier index; however in order to construct the OFDMA signal as in 8.3.5.2.3.3 the frequency offset index is required. The frequency offset index of a particular carrier is specified terms of its carrier index by equation (2).

$$k_{foi} = \begin{cases} k_{ci} - N_{used}/2, & k_{ci} < N_{used}/2 \\ k_{ci} - N_{used}/2 + 1, & k_{ci} \geq N_{used}/2 \end{cases} \quad (2)$$

where

k_{foi} = frequency offset index

k_{ci} = carrier index

N_{used} = number of used carriers

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