Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>	
Title	RS Amble Amplitude	
Date Submitted	2007-03-05	
Source(s)	Dorin Viorel Charlie Huo Fujitsu Microelectronics Canada Inc. Mike Hart Fujitsu Laboratories Europe	Voice: +1 403 207 6309; dviorel@fmci.fujitsu.com Voice: +1 403 207 6334; chuo@fmci.fujitsu.com Voice: +44 20 86064523; mike.hart@uk.fujitsu.com
Re:	80216j-07_007r2: “Call for Technical Comments and Contributions regarding IEEE Project 802.16j”	
Abstract	This document specifies the RS relay amble amplitude.	
Purpose	Text proposal for 802.16j Baseline Document	
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.	
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE’s name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE’s sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.	
Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.	

RS Amble Amplitude

Dorin Viorel, Charlie Huo
Fujitsu Microelectronics Canada Inc.

Mike Hart
Fujitsu Laboratories Europe

1. Introduction

In order to provide proper time and frequency synchronization, and Cell ID information for the sub-ordinate Relay Stations attempting to enter the network through a parent RS, a relay amble structure has to be defined. One of the parameters of this relay structure is its amplitude.

2. Details

In order to avoid confusing the MSs attempting to execute a network entry using a frame structure employing two different amble structures, a new PN sequence is required in order to support the high mobility RS requirements.

Considering the new PN sequence which has a PAPR behavior almost identical with the old preamble, the pilot subcarriers present in the amble structure, used for 512, 1 k and 2 k FFT shall be modulated according with the Equation 1:

$$\mathrm{Re}\{\mathrm{Pr}\,eamblePilotsModulated\} = 4\sqrt{2}(\frac{1}{2} - w_k)$$
$$\mathrm{Im}\{\mathrm{Pr}\,eamblePilotsModulated\} = 0$$

Equation 1

For FFT128, the pilot subcarriers present in the RS amble structure shall be modulated as present in Equation 2

$$\mathrm{Re}\{\mathrm{Pr}\,eamblePilotsModulated\} = 4(\frac{1}{2} - w_k)$$
$$\mathrm{Im}\{\mathrm{Pr}\,eamblePilotsModulated\} = 0$$

Equation 2

The reason for the reduced amplitude for 128 point FFT is that the PAPR of the new PN sequences will be higher, due to the fact that the sequence set size from which new sequences for the RS amble can be extracted is limited.

3. Conclusion

The amplitude of the pilot subcarriers present in the new RS amble is the same like for the access preamble, for 512, 1k and 2k FFT. A -3 dB correction is required for FFT128 in order to compensate for the increased PAPR of the new PN sequences for RS amble in the 128 FFT mode.

4. Specific text changes

[Insert new subclause 8.4.9.4.3.3]

8.4.9.4.3.3 Relay amble pilot modulation

The pilots in the relay amble for 512FFT, 1k FFT and 2k FFT shall follow the instructions in 8.4.6.1.1.3 and shall be modulated according to Equation [136]

The pilots in the relay midamble for 128 FFT shall follow the instructions in 8.4.6.1.1.3 and shall be modulated according to Equation xxx

$$\mathrm{Re}\{\mathrm{Pr}\,eamblePilotsModulated\} = 4(\frac{1}{2} - w_k)$$
$$\mathrm{Im}\{\mathrm{Pr}\,eamblePilotsModulated\} = 0$$

Equation xxx

References

1. IEEE 802.16-2004 “IEEE Standard for Local and Metropolitan Area Networks – Part 16”
2. IEEE 802.16e-2005