Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**An enhanced 4-antenna soft packet combining scheme**
Date Submitted	**2005-01-11**
Source(s)	Wei Bai, YoungHak Kim Samsung Electronics Co. Ltd.	w.bai@samsung.com younghak.kim@samsung.com
Re:	IEEE P802.16e/D5a
Abstract	The document proposes an enhanced 4-antenna soft packet combining scheme.
Purpose	Adoption of proposed changes into P802.16e/D5a-2004
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>.

An Enhanced 4-antenna Soft Packet Combining Scheme

Wei Bai, YoungHak Kim

Samsung Electronics

1 Introduction

We propose an enhanced 4-antenna soft packet combining scheme in the OFDMA PHY. This soft packet combining scheme improves upon the performance of the scheme specified in current standard [1]. Furthermore, Only ── angle rotation to the symbol is needed in implementation process of the scheme.

2 Proposed 4-antenna Soft Packet Combining Scheme

The 4-antenna soft packet combining scheme in the current standard is described as below.

Table 1 STC subpacket combining in current standard (4 Tx antennas case)

	initial transmission	odd retransmission	even retransmission
Space time code incremental redundancy for matrix A			

We propose a new soft packet combining scheme as given in Table 2.

Table 2 The proposed STC subpacket combining (4 Tx antennas case)

	( )=0 transmission	( )=1 transmission	( )=2 transmission	( )=3 transmission
Space time code incremental redundancy for matrix A				

For n*th* (n=0,1,…) transmission, if ( )=0, the transmission matrix will be . If ( )=1, the transmission matrix will be . If ( )=2, the transmission matrix will be . If ( )=3, the transmission matrix will be . The MSS shall process the initial transmission, 1st re-transmission and 2nd re-transmission etc in the form of space time decoding. Furthermore, the SPID in H-ARQ_Control IE need not be

modified.

The proposed soft packet combining scheme with LZF detection improves upon the performance of the scheme specified in current standard as shown in Figure 1.
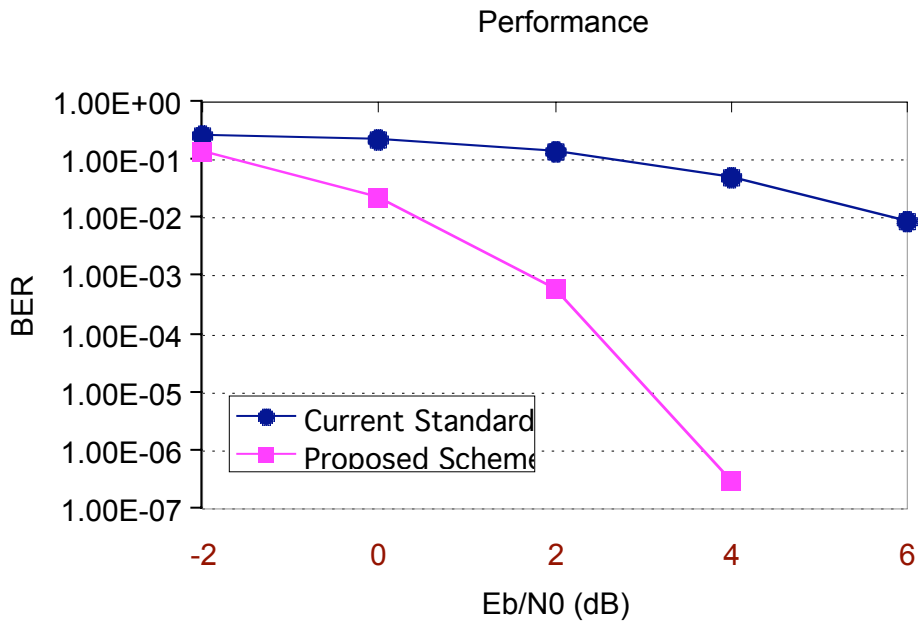

Figure 1 Performance comparison of 4th transmission of the matrix A in current standard and the proposed scheme: PUSC, ITU-VA, 3km/h, QPSK, Turbo code, R=0.5

3 Specific Text Changes

[Modify the following sections of 802.16e/D5a]

8.4.8.9 STC subpacket combining:

Replace the existing Table 315n with the following table:

Table 315n – STC subpacket combining (4-transmit antenna case)

	( )=0 transmission	( )=1 transmission	( )=2 transmission	( )=3 transmission

Space time code incremental redundancy for matrix C				