Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Clarification of Repetition**
Date Submitted	**2005-07-18**
Source(s)	Jaehee Cho, Seungjoo Maeng, Jaeho Jeon, Soonyoung Yoon, Jeong-Heon Kim, Jaehyok Lee, Myungkwang Byun, Inseok Hwang, Panyuh Joo, Jiho Jang, Sanghoon Sung, Hoon Huh, janghoon yang, ByoungHa Yi Samsung Electronics Co. Ltd. jaehee1.cho@samsung.com
Re:	IEEE P802.16-2004/Cor1-D3
Abstract	Clarification of repetition.
Purpose	Adoption of suggested changes into IEEE P802.16-2004/Cor1-D4
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 (Version 1.0) <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, if there is technical justification in the opinion of the standards-developing committee and provided the IEEE receives assurance from the patent holder that it will license applicants under reasonable terms and conditions for the purpose of implementing 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:r.b.marks@ieee.org > as early as possible, in written or electronic form, of any patents (granted or under application) that may cover technology that is under consideration by or has been approved by IEEE 802.16. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.

Introduction

The CINR measurement scheme in 8.4.11.3 contains some errors. We provide text to correct it.

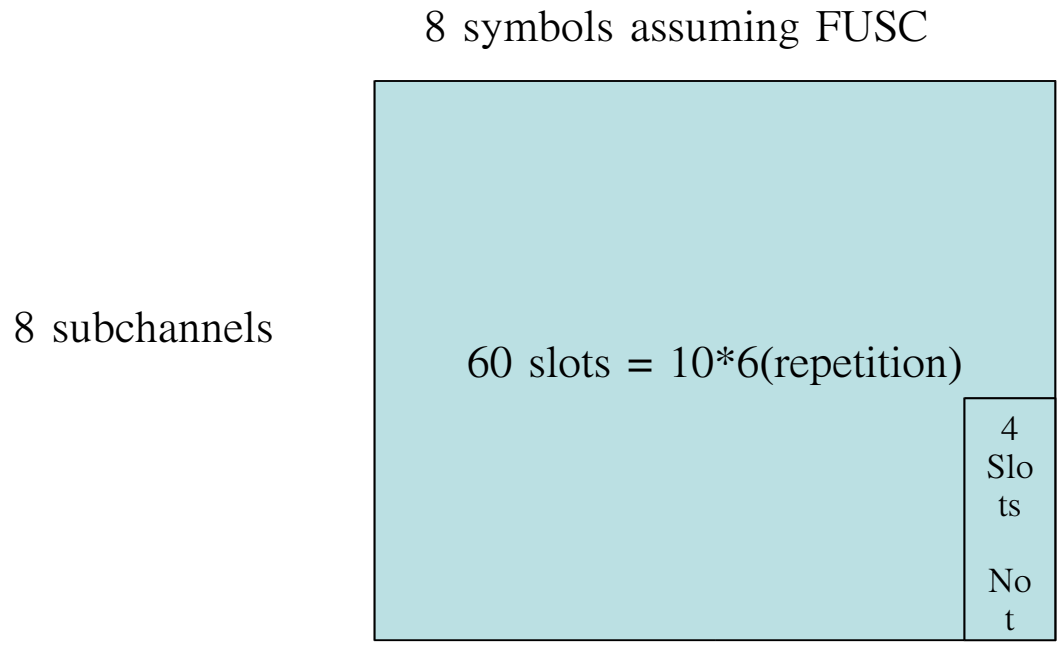
Motivations

The repetition scheme was modified from IEEE802.16-2004.

During the modification, it is confined to have the number of the allocate slots to be the whole multiples of repetition factor R.
For downlink, it may not be possible to allocate whole multiples of R due to the nature of 2D allocation.
When the number of remaining slots for a DL subframe is not the whole mutiples of R(=2,4,6), the slot can't be assigned for a burst that shall use repetition scheme.
It will decrease the scheduling efficiency.
This inefficiency can be avoided by allowing to allocate the slots in the range from the whole mutiples of repetition factor R to a whole multiple of the repetition factor R (let's say it K) to K + (R-1) for the downlink.
For example, when the required number of slots before the repetition is 10 and the repetition of R=6 shall be applied for the burst transmission, then the number of the allocated slots (Ns) for the burst can be 60 slots ~ 65 slots. (See the diagram below)
As a result, when there remains Ns slots, a BS can send data that corresponds to the slots of floor(Ns/R).

In the original text of the repetition block in IEEE802.16-2004, there are no restrictions on Ns. So, this comment is restoring the original intension of IEEE802.16-2004.

Because of the repetition scheme, the padding scheme in the randomization subclause (8.4.9.1) shall be applied to the non-repeated number of slots. In the current spec., it is not reflected.



Suggested Text changes

8.4.9.5 Repetition

[Modify the text as follows]

Repetition coding can be used to further increase signal margin over the modulation and FEC mechanisms. In the case of repetition coding, R = 2, 4, or 6, the number of allocated slots (Ns) shall be a whole multiple of the repetition factor R for uplink. For downlink, the number of allocated slots (Ns) may only exceed K*R by at most R-1 slots, where K is the number of slots before repetition. For example, when the required number of slots before the repetition is 10 and the repetition of R=6 shall be applied for the burst transmission, then the number of the allocated slots (Ns) for the burst can be from 60 slots to 65 slots.

The binary data that fits into a region that is repetition coded is reduced by a factor R compared to a non-repeated region of the floor(Ns/R) slots with the same size and FEC code type. After FEC and bit-interleaving, the data is segmented into slots, and each group of bits designated to fit in a slot will be repeated R times to form R contiguous slots following the normal slot ordering that is used for data mapping. The actual constellation data can be different because of the permutation as defined by 8.4.9.4.1. This repetition scheme applies only to QPSK modulation; it can be applied in all coding schemes except H-ARQ with CTC defined in 8.4.9.2.3.5.

8.4.9.1 Randomization

[Change the first paragraph as indicated:]

Data randomization is performed on all data transmitted on the downlink and uplink, except the FCH. The randomization is initialized on each FEC block ~~(using the first Subchannel offset and OFDMA symbol offset on which the FEC block is mapped. Symbol offset, for both UL and DL, shall be counted from the start of the frame, where the DL preamble shall be count 0)~~. If the amount of data to transmit does not fit exactly the amount of data allocated, padding of 0xFF ("1" only) shall be added to the end of the transmission block, up to the amount of data allocated. Here the amount of data allocated means the amount of data that corresponds to the slots of floor (Ns/R) where Ns is the number of the all slots for the data transmission and R is the repetition factor used.