

| | |
|------------------------------|---|
| Project | IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 > |
| Title | Modifications to Block and Convolutional Turbo Coding for OFDM |
| Date Submitted | 2004-01-15 |
| Source(s) | Ron Murias, Wi-LAN Inc. ronm@wi-lan.com Brian Banister, Comtech AHA Yossi Segal, Runcom |
| Re: | |
| Abstract | This submission addresses changes required to the Turbo Coding sections of OFDM to accommodate shorter blocks found in subchannel mode. |
| Purpose | Submitted for review by 802.16 members. |
| 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 >. |

Modifications to Block and Convolutional Turbo Coding for OFDM

Ron Murias (Wi-LAN Inc)

Brian Banister (Comtech AHA)

Yossi Segal (Runcom)

Introduction

Subchannels in OFDM result in smaller block sizes, and the descriptions for block Turbo Codes (BTC) and convolutional Turbo Codes (CTC) must be modified to accommodate the smaller block sizes. The included text allows for blocks of arbitrary length for the BTC and CTC modes.

[Insert into the end of section 8.3.3.2.2, fix up the table and figure numbers as required:]

When subchannelization is used, the coding block size is limited to blocks at least 96 bits in length. The number of bits is calculated as followed:

$$\frac{N_{full}}{16} \cdot N_{activeSubs}$$

where:

N_{full} = number of bits for 16-subchannel (full) mode

$N_{activeSubs}$ = number of active subchannels (1-16)

| Coded Bits | Approximate Rate | Constituent Code | Code Parameters |
|------------|------------------|--------------------|---------------------------|
| 96 | 1/2 | (32, 26), (4, 3) | $I_x=8, I_v=0, B=0, Q=6$ |
| | 2/3 | (16, 15), (8, 7) | $I_x=0, I_v=2, B=0, Q=3$ |
| | 3/4 | (16, 15), (8, 7) | $I_x=0, I_v=2, B=0, Q=3$ |
| 144 | 1/2 | (16, 11), (8, 7) | $I_x=4, I_v=4, B=0, Q=5$ |
| | 2/3 | (32, 26), (8, 7) | $I_x=8, I_v=2, B=0, Q=2$ |
| | 3/4 | (16, 15), (16, 15) | $I_x=4, I_v=4, B=0, Q=1$ |
| 192 | 1/2 | (16, 11), (16, 15) | $I_x=2, I_v=2, B=4, Q=1$ |
| | 2/3 | (32, 26), (8, 7) | $I_x=4, I_v=1, B=4, Q=0$ |
| | 3/4 | (16, 15), (16, 15) | $I_x=2, I_v=2, B=4, Q=5$ |
| 288 | 1/2 | (32, 26), (16, 15) | $I_x=14, I_v=0, B=0, Q=4$ |
| | 2/3 | (32, 26), (16, 15) | $I_x=11, I_v=2, B=6, Q=5$ |
| | 3/4 | (32, 31), (16, 15) | $I_x=14, I_v=0, B=0, Q=7$ |
| 384 | 1/2 | (32, 26), (16, 11) | $I_x=4, I_v=2, B=8, Q=6$ |
| | 2/3 | (32, 26), (16, 11) | $I_x=4, I_v=2, B=8, Q=6$ |
| | 3/4 | (32, 26), (16, 15) | $I_x=0, I_v=4, B=0, Q=6$ |
| 576 | 1/2 | (32, 26), (32, 26) | $I_x=8, I_v=8, B=0, Q=4$ |
| | 2/3 | (32, 26), (32, 26) | $I_x=8, I_v=8, B=0, Q=4$ |
| | 3/4 | (16, 15), (64, 57) | $I_x=4, I_v=16, B=0, Q=3$ |
| 768 | 1/2 | (32, 26), (32, 26) | $I_x=0, I_v=8, B=0, Q=4$ |
| | 2/3 | (32, 26), (32, 26) | $I_x=0, I_v=8, B=0, Q=4$ |
| | 3/4 | (64, 57), (16, 15) | $I_x=7, I_v=2, B=30, Q=4$ |
| 1152 | 1/2 | (64, 63), (32, 26) | $I_x=3, I_v=13, B=7, Q=5$ |
| | 2/3 | (64, 63), (32, 26) | $I_x=3, I_v=13, B=7, Q=5$ |
| | 3/4 | (32, 31), (64, 57) | $I_x=13, I_v=3, B=7, Q=5$ |

[Change section 8.3.3.2.3 as follows, fix up the table and figure numbers as required:]

Append:

“The encoder is fed by blocks of k bits or N couples ($k = 2*N$ bits). For all the frame sizes k is a multiple of 8 and N is a multiple of 4. N shall be limited to $8 \leq N/4 \leq 1024$.”

With:

“For subchannelization mode, the coding block size is limited to blocks at least 48 bits in length, and no more than 1024 bits in length. Also, k cannot be a multiple of 7.”