Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Decrease DCD/UCD message overhead
Date Submitted	**2005-01-12**
Source(s)	Jianjun Wu, John Lee, Duke Dang, Lucy Chen HUAWEI No.98,Lane91,Eshan Road,Pudong ,Shanghai,China Pudong Lujiazui Software Park ,200127 P.R. China, Voice: 86-21-68644808-24717 Fax: 86-21-50898375 mailto:wujianjun@huawei.com
Re:	Contribution on comments to P80216-REVd_D5
Abstract	Decrease DCD/UCD message overhead
Purpose	Adoption
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>.

Decrease DCD/UCD message overhead

Jianjun Wu, John Lee£¨Duke Dang£¨Lucy Chen
HUAWEI

1. Introduction

In the P80216-REVd_D5, the DCD/UCD message will broadcast periodicity to describe the Downlink and Uplink channel. And the DCD/UCD message have too much items, which will cause the high overhead in the frame transmit the DCD/UCD. One disaster after another, in the current standard, the MAP relationship between DIUC/UIUC and FEC Code Type use TLV code, and each FEC Code Type occupy 3 bytes.

In this contribution, in order to decrease the overhead, we proposed a new solution, which can substantially reduce the overhead of DCD/UCD and will not change the current function and meaning of DCD/UCD.

2. Proposed Text Changes

The contribution propose that pre_fixing the relationship between FEC Code Type and the FEC Code Type Index as following:

For example, in OFDMA PHY, we can add Table xxx as the following in 8.4.x.x:

FEC Code Type Index	FEC Code Type
0	0 = QPSK (CC) 1/2
1	QPSK (CC) 3/4
2	16-QAM (CC) 1/2
3	16-QAM (CC) 3/4
4	64-QAM (CC) 2/3
5	64-QAM (CC) 3/4
6	QPSK (BTC) 1/2
7	QPSK (BTC) 3/4 or 2/3
8	16-QAM (BTC) 3/5
9	16-QAM (BTC) 4/5
10	64-QAM (BTC) 2/3 or 5/8
11	64-QAM (BTC) 5/6 or 4/5
12	QPSK (CTC) 1/2
13	QPSK (CTC) 2/3
14	QPSK (CTC) 3/4
15	16-QAM (CTC) 1/2
16	16-QAM (CTC) 3/4
17	64-QAM (CTC) 2/3
18	64-QAM (CTC) 3/4
19	64-QAM (CTC) 5/6
20	QPSK (ZT CC) 1/2
21	QPSK (ZT CC) 3/4
22	16-QAM (ZT CC) 1/2
23	16-QAM (ZT CC) 3/4
24	64-QAM (ZT CC) 2/3
25	64-QAM (ZT CC) 3/4
26~255	reserved

And DCD/UCD message can use FEC Code Type Index directly, not using TLV code.

So we can modify Page46, Table 15 as the following:

Syntax	Size	Notes
DCD_Message_Format() {		
Management Message Type = 1	8 bits	
Downlink channel ID	8 bits	
Configuration Change Count	8 bits	
TLV Encoded information for the overall channel	variable	TLV specific
Begin PHY Specific Section {		See applicable PHY section
for (*i* = 1; *i* <= *n*; *i*++) {		For each downlink burst profile 1 to n
Downlink_Burst_Profile		PHY specific
FEC Code Type Index	8 bits	PHY specific
}		
}		
}		

And modify Page668, Table 361 as the following:

Table 361—DCD burst profile encodings—WirelessMAN-OFDMA

Name	Type (1 bytes)	Length	Value (variable length)
~~FEC Code type~~	~~150~~	~~1~~	~~0 = QPSK (CC) 1/2 1 = QPSK (CC) 3/4 2 = 16-QAM (CC) 1/2 3 = 16-QAM (CC) 3/4 4 = 64-QAM (CC) 2/3 5 = 64-QAM (CC) 3/4 6 = QPSK (BTC) 1/2 7 = QPSK (BTC) 3/4 or 2/3 8 = 16-QAM (BTC) 3/5 9 = 16-QAM (BTC) 4/5 10 = 64-QAM (BTC) 2/3 or 5/8 11 = 64-QAM (BTC) 5/6 or 4/5 12 = QPSK (CTC) 1/2 13 = QPSK (CTC) 2/3 14 = QPSK (CTC) 3/4 15 = 16-QAM (CTC) 1/2 16 = 16-QAM (CTC) 3/4 17 = 64-QAM (CTC) 2/3 18 = 64-QAM (CTC) 3/4 19 = 64-QAM (CTC) 5/6 20 = QPSK (ZT CC) 1/2 21 = QPSK (ZT CC) 3/4 22= 16-QAM (ZT CC) 1/2 23= 16-QAM (ZT CC) 3/4 24= 64-QAM (ZT CC) 2/3 25= 64-QAM (ZT CC) 3/4 26..255 = *Reserved*~~
DIUC Mandatory exit threshold	151	1	0–63.75 dB CINR at or below where this DIUC can no longer be used and where this change to a more robust DIUC is required, in 0.25 dB units. See Figure 81.
DIUC Minimum entry threshold	152	1	0–63.75 dB The minimum CINR required to start using this DIUC when changing from a more robust DIUC is required, in 0.25 dB units. See Figure 81.

If the system realize 6 FEC Code Type, the solution can save 6*2=12bytes=96bits overhead.

3. Proposed Text Changes

Modify Page46, Table 15 as the following:

Syntax	Size	Notes
DCD_Message_Format() {		
Management Message Type = 1	8 bits	

Downlink channel ID	8 bits	
Configuration Change Count	8 bits	
TLV Encoded information for the overall channel	variable	TLV specific
Begin PHY Specific Section {		See applicable PHY section
for (*i* = 1; *i* <= *n*; *i*++) {		For each downlink burst profile 1 to n
Downlink_Burst_Profile		PHY specific
FEC Code Type Index	8 bits	PHY specific
}		
}		
}		

Modify Page665, Table 358 as the following:

Table 358—DCD burst profile encodings—WirelessMAN-SC

Name	Type (1 bytes)	Length	Value (variable length)
Modulation type	150	1	1 = QPSK 2 = 16-QAM 3 = 64-QAM
~~FEC Code Type~~	~~151~~	~~1~~	~~1 = Reed–Solomon only~~ ~~2 = Reed–Solomon + Inner Block Convolutional Code (BCC)~~ ~~3 = Reed–Solomon + Inner (9,8) Parity Check Code~~ ~~4 = BTC (Optional)~~ ~~5–255 = *Reserved*~~
RS Information bytes (K)	152	1	K = 6 - 255
RS Parity bytes (R)	153	1	R = 0–32 bytes (error correction capability T= 0–16 bytes)
BCC code type	154	1	1 = (24,16) 2–255 = *Reserved*
BTC Row code type	155	1	1 = (64,57) Extended Hamming 2 = (32,26) Extended Hamming 3–255 = *Reserved*
BTC Column code type	156	1	1 = (64,57) Extended Hamming 2 = (32,26) Extended Hamming 3–255 = *Reserved*
BTC Interleaving type	157	1	1 = No interleaver, 2 = Block Interleaving, 3–255 = *Reserved*
Last codeword length	158	1	1=fixed; 2=shortened allowed (optional) This allows for the transmitter to shorten the last codeword, based upon the allowable shortened codewords for the particular code type.
DIUC Mandatory exit threshold	159	1	0–63.75 Db CINR at or below where this DIUC can no longer be used and where this change to a more robust DIUC is required, in 0.25 Db units. See Figure 81.

DIUC Minimum entry threshold	160	1	0–63.75 Db The minimum CINR required to start using this DIUC when changing from a more robust DIUC is required, in 0.25 Db units. See Figure 81.
Preamble presence	161	1	0 = burst not preceded with preamble 1 = burst preceded with preamble. If the preamble is present, it consumes the first PSs of the interval.
CID_In_DL_IE	162	1	0 = CID does not appear DL-MAP IE (default) 1 = CID does appear in DL-MAP IE 2-255 = *Reserved*

Add Table xxx as the following in 8.1.x.x:

FEC Code Type Index	FEC Code Type
1	Reed–Solomon only
2	Reed–Solomon + Inner Block Convolutional Code(BCC)
3	Reed–Solomon + Inner (9,8) Parity Check Code
4	BTC (Optional)
5~255	*Reserved*

Modify Page666, Table 359 as the following:

Table 359—DCD burst profile encodings—WirelessMAN-SCa

Name	Type (1 bytes)	Length	Value (variable length)
~~Modulation type~~	~~150~~	~~1~~	~~4 MSB:~~ ~~1 =QPSK, 2 = 16-QAM, 3 = 64-QAM, 4 = 256-QAM,~~ ~~5 = BPSK, ,6-9 = Spread BPSK with Fs=0-3, 10-15 = *Reserved*~~ ~~4 LSB:~~ ~~1 = CC+RS without block interleaving,~~ ~~2 = CC+RS with block interleaving~~ ~~3 = no FEC, 4 = BTC, 5 = CTC, 6–15 = *Reserved*~~
RS Information bytes (K)	151	1	K = 6 - 239
RS Parity bytes (R)	152	1	R = 0–16 bytes (error correction capability = 0–8 bytes) R = 17–255 *Reserved*
DIUC Mandatory exit threshold	153	1	0–63.75 Db CINR at or below where this DIUC can no longer be used and where this change to a more robust DIUC is required, in 0.25 Db units. See Figure 81.
DIUC Minimum entry threshold	154	1	0–63.75 Db The minimum CINR required to start using this DIUC when changing from a more robust DIUC is required, in 0.25 Db units. See Figure 81.
CC/CTC-Specific parameters	155	1	0 = rate 1/2 (for BPSK, QPSK, 16-QAM) 1 = rate 2/3 (for QPSK, 64-QAM) 2 = rate 3/4 (for BPSK, QPSK, 16-QAM, 256-QAM) 3 = rate 5/6 (for QPSK, 64-QAM) 4 = rate 7/8 (for QPSK, 256-QAM) 5–255 = *Reserved*

Block interleaver depth	156	1	Number of rows (Reed–Solomon code words) used in block interleaver between Reed–Solomon and CC: 2–66 = rows 0, 1, 67–255 = *Reserved*
BTC Code selector	157	1	Value used to choose set of BTC row/column codes. 1–3 = *Cbank* 0, 4–255 = *Reserved*
Spreading Parameters	159	1	
CID_In_DL_IE	160	1	0 = CID does not appear DL-MAP IE (default) 1 = CID does appear in DL-MAP IE 2-255 = *Reserved*

Add Table xxx as the following in 8.2.x.x:

FEC Code Type Index	FEC Code Type
x	4 MSB: 1 =QPSK, 2 = 16-QAM, 3 = 64-QAM, 4 = 256-QAM, 5 = BPSK, ,6-9 = Spread BPSK with Fs=0-3, 10-15 = *Reserved* 4 LSB: 1 = CC+RS without block interleaving, 2 = CC+RS with block interleaving 3 = no FEC, 4 = BTC, 5 = CTC, 6–15 = *Reserved*

Modify Page668, Table 360 as the following:

Table 360—DCD burst profile encodings—WirelessMAN-OFDM

Name	Type (1 bytes)	Length	Value (variable length)
~~FEC Code type~~	~~150~~	~~1~~	~~0 = BPSK (CC) 1/2 1 = QPSK (RS+CC/CC) 1/2 2 = QPSK (RS+CC/CC) 3/4 3 = 16-QAM (RS+CC/CC) 1/2 4 = 16-QAM (RS+CC/CC) 3/4 5 = 64-QAM (RS+CC/CC) 2/3 6 = 64-QAM (RS+CC/CC) 3/4 7 = QPSK (BTC) 1/2 8 = QPSK (BTC) 3/4 or 2/3 9 = 16-QAM (BTC) 3/5 10 = 16-QAM (BTC) 4/5 11 = 64-QAM (BTC) 2/3 12 = 64-QAM (BTC) 5/6 13 = QPSK (CTC) 1/2 14 = QPSK (CTC) 2/3 15 = QPSK (CTC) 3/4 16 = 16-QAM (CTC) 1/2 17 = 16-QAM (CTC) 3/4 18 = 64-QAM (CTC) 2/3 19 = 64-QAM (CTC) 3/4 20–255 = *Reserved*~~
DIUC Mandatory exit threshold	151	1	0–63.75 Db CINR at or below where this DIUC can no longer be used and where this change to a more robust DIUC is required, in 0.25 Db units. See Figure 81.
DIUC Minimum entry threshold	152	1	0–63.75 Db The minimum CINR required to start using this DIUC when changing from a more robust DIUC is required, in 0.25 Db units. See Figure 81.
TCS_enable	153	1	0 = TCS diabled 1 = TCS enabled 2-255 = *Reserved*

Add Table xxx as the following in 8.3.x.x:

FEC Code Type Index	FEC Code Type

0	0 = BPSK (CC) 1/2
1	QPSK (RS+CC/CC) 1/2
2	QPSK (RS+CC/CC) 3/4
3	16-QAM (RS+CC/CC) 1/2
4	16-QAM (RS+CC/CC) 3/4
5	64-QAM (RS+CC/CC) 2/3
6	64-QAM (RS+CC/CC) 3/4
7	QPSK (BTC) 1/2
8	QPSK (BTC) 3/4 or 2/3
9	16-QAM (BTC) 3/5
10	16-QAM (BTC) 4/5
11	64-QAM (BTC) 2/3
12	64-QAM (BTC) 5/6
13	QPSK (CTC) 1/2
14	QPSK (CTC) 2/3
15	QPSK (CTC) 3/4
16	16-QAM (CTC) 1/2
17	16-QAM (CTC) 3/4
18	64-QAM (CTC) 2/3
19	64-QAM (CTC) 3/4
20~255	reserved

Modify Page668, Table 361 as the following:

Table 361—DCD burst profile encodings—WirelessMAN-OFDMA

Name	Type (1 bytes)	Length	Value (variable length)
~~FEC Code type~~	~~150~~	~~1~~	~~0 = QPSK (CC) 1/2 1 = QPSK (CC) 3/4 2 = 16-QAM (CC) 1/2 3 = 16-QAM (CC) 3/4 4 = 64-QAM (CC) 2/3 5 = 64-QAM (CC) 3/4 6 = QPSK (BTC) 1/2 7 = QPSK (BTC) 3/4 or 2/3 8 = 16-QAM (BTC) 3/5 9 = 16-QAM (BTC) 4/5 10 = 64-QAM (BTC) 2/3 or 5/8 11 = 64-QAM (BTC) 5/6 or 4/5 12 = QPSK (CTC) 1/2 13 = QPSK (CTC) 2/3 14 = QPSK (CTC) 3/4 15 = 16-QAM (CTC) 1/2 16 = 16-QAM (CTC) 3/4 17 = 64-QAM (CTC) 2/3 18 = 64-QAM (CTC) 3/4 19 = 64-QAM (CTC) 5/6 20 = QPSK (ZT CC) 1/2 21 = QPSK (ZT CC) 3/4 22= 16-QAM (ZT CC) 1/2 23= 16-QAM (ZT CC) 3/4 24= 64-QAM (ZT CC) 2/3 25= 64-QAM (ZT CC) 3/4 26..255 = *Reserved*~~
DIUC Mandatory exit threshold	151	1	0–63.75 dB CINR at or below where this DIUC can no longer be used and where this change to a more robust DIUC is required, in 0.25 dB units. See Figure 81.
DIUC Minimum entry threshold	152	1	0–63.75 dB The minimum CINR required to start using this DIUC when changing from a more robust DIUC is required, in 0.25 dB units. See Figure 81.

Add Table xxx as the following in 8.4.x.x:

FEC Code Type Index	FEC Code Type
0	0 = QPSK (CC) 1/2
1	QPSK (CC) 3/4
2	16-QAM (CC) 1/2
3	16-QAM (CC) 3/4
4	64-QAM (CC) 2/3

5	64-QAM (CC) 3/4
6	QPSK (BTC) 1/2
7	QPSK (BTC) 3/4 or 2/3
8	16-QAM (BTC) 3/5
9	16-QAM (BTC) 4/5
10	64-QAM (BTC) 2/3 or 5/8
11	64-QAM (BTC) 5/6 or 4/5
12	QPSK (CTC) 1/2
13	QPSK (CTC) 2/3
14	QPSK (CTC) 3/4
15	16-QAM (CTC) 1/2
16	16-QAM (CTC) 3/4
17	64-QAM (CTC) 2/3
18	64-QAM (CTC) 3/4
19	64-QAM (CTC) 5/6
20	QPSK (ZT CC) 1/2
21	QPSK (ZT CC) 3/4
22	16-QAM (ZT CC) 1/2
23	16-QAM (ZT CC) 3/4
24	64-QAM (ZT CC) 2/3
25	64-QAM (ZT CC) 3/4
26~255	reserved