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Source(s)	Tal Kaitz, Ran Yaniv Alvarion Ltd.	tal.kaitz@alvarion.com, ran.yaniv@alvarion.com
	Jon Labs, Rainer Ullmann Wavesat, Inc.	jlabs@wavesat.com, rullmann@wavesat.com
	Ambroise Popper SEQUANS Communications	ambroise@sequans.com
	Shane Rogers Wi-Lan, Inc.	srogers@wi-lan.com

Re:	Comments submitted to P802.16e/D5 Sponsor Ballot.

Abstract	This document harmonizes the comments submitted to the P802.16e/D5 Sponsor Ballot pertaining to DL Subchannelization for WirelessMAN-OFDM. The intent is to fix errors, clear ambiguities and clarify the operation of this feature.

Purpose	Consider recommended corrections in Ballot Sponsor Resolution.

Harmonization of DL Subchannelization for WirelessMAN-OFDM

Tal Kaitz, Ran Yaniv
Alvarion, Ltd.

Jon Labs, Rainer Ullmann
Wavesat, Inc.

Ambroise Popper
SEQUANS Communications

Shane Rogers
Wi-Lan, Inc.

Introduction and Motivation

In IEEE P802.16e/D5, DL Subchannelization has been added to the WirelessMAN-OFDM mode to enhance performance of that mode for mobility. However, a number of errors and ambiguities exist which were raised in comments submitted during the Sponsor Ballot process. This document attempts to harmonize all these comments, address the errors and ambiguities and provide some additional text for clarification of the operation of this feature.

The comments which this document covers from the database 80216-04_69r1.USR are: 1051, 1053, 1054, 1055, 1057, 1058, 1060, 1061, 1062, 1063, and 1064. Some of these comments are editorial and included here for completeness.

Issue #1: Precision on embedded IEs in the CCH burst (tied to comment 1058)

Explanation of Problem

It is not clear from the text how the embedded MAP elements are used. As an SS cannot demodulate more than 1 burst per frame, when it is demodulating a CCH, it cannot demodulate any data bursts addressed to it. The principle is therefore that the SBCH_DL_MAP_IEs contained in the CCH only describe allocations in future frames. In all frames where bursts are allocated to a given SS, the BS shall assume that the SS cannot demodulate the CCH at the same time and therefore not put any SBCH_DL_MAP_Ies pertinent to that SS in the CCH of that particular frame. Apart from the frames in which it has allocated bursts, an SS shall always demodulate the CCH. The concept is illustrated in Figure 1.

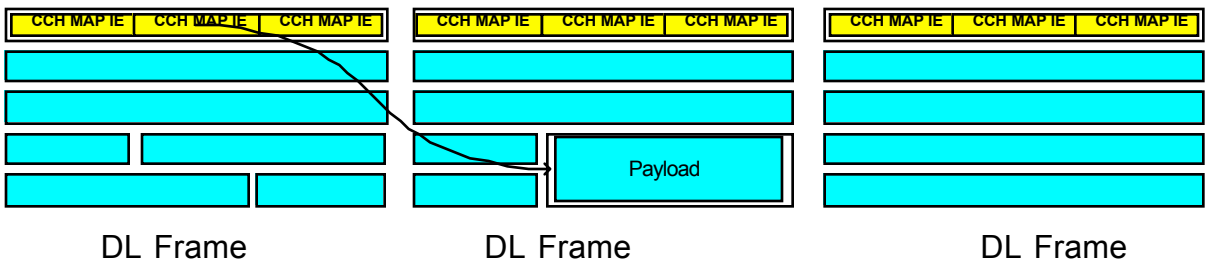

Figure 1

Suggested Remedy

Modify paragraph p.157, starting line 29 (before section 8.3.6):

A BS shall assume that the MSS is not capable of receiving more than one burst in a single frame. Therefore downlink allocations contained in SBCH_DL_MAP_IEs in the CCH shall point to future frames. When an allocation is present for a given MSS, the BS shall assume that the MSS may not be capable of demodulating the CCH in that frame, and therefore not include any SBCH_DL_MAP_IEs or SBCH_UL_MAP_IEs for that MSS.

Issue #2: CCH Definition (tied to comments 1051, 1053, 1054, 1055, 1057)

Explanation of Problem

On page 156, line 33 in Section 8.3.5.1.1, Table 222c gives the specification of the DL subchannelization DLFP, SBCH_DLFP. The CCH duration field in the SBCH_DLFP is 4 bits, which means the maximum length the CCH can be is 15 symbols. Since the CCH contains map information, this length is too short.

In addition the bit boundaries for the DLFP are not very well byte aligned, the CCH midamble repetition values are not defined, and the table reference for the CCH subchannel index is incorrect.

Suggested Remedy

The Suggest Remedy is to modify Table 222c to:

Table 222c-SBCH_DLFP

Field	Size	Comments
SBCH_DL_Frame_Prefix_Format() {		
Base_Station_ID	4 bits	4 LSBs of BS ID. The burst specified by the DFLP shall not be decoded if these bits do not match those of the BS on which it is registered
Frame_Number	4 bits	4 LSBs of Frame Number field as specified in Table 214
Configuration_Change_Count	4 bits	4 LSBs of Change Count value as specified in 6.3.2.3.1
~~Reserved~~	~~5 bits~~	~~Shall be set to zero.~~
CCH_Rate ID	4 bits	The Rate ID, according to Table 222 of the first burst of the CCH.
CCH duration	8 bits	The duration of the first burst in the CCH.
Reserved	1 bit	Shall be set to zero.

CCH subchannel index	5 bits	The subchannel index in which the CCH is transmitted. See Table ~~192~~211.
~~CCH_Rate ID~~	~~4 bits~~	~~The Rate ID, according to Table 222 of the first burst of the CCH.~~
~~CCH duration~~	~~4 bits~~	~~The duration of the first burst in the CCH.~~
CCH midamble repetition	2 bits	The midamble repetition rate of the first burst of the CCH~~.~~: 0b00: Preamble only 0b01: Midamble after every 4 data symbols 0b10: Midamble after every 8 data symbols 0b11: Midamble after every 16 data symbols
HCS	8 bits	An 8-bit Header Check Sequence; calculated as specified in Table 5.
}		

Issue #3: CCH for AAS (tied to comment 1060)

Explanation of Problem

On page 157, line 29, the draft states,

> *"For AAS support, CCH bursts may be transmitted on directed beams or may be transmitted using beam pattern diversity."*

This statement is incorrect, as the intent was to have only one CCH in a DL subchannelization zone.

Suggested Remedy

On page 157, line 29, delete the sentence: "For AAS support, CCH bursts may be transmitted on directed beams or may be transmitted using beam pattern diversity."

Issue #4: Randomization in the DL Subchannelization Zone (tied to comment 1061)

Explanation of Problem

At the end of page 157, line 32, it is still not clear how randomization is handled for DL subchannelization for the OFDM PHY. DL subchannelization was added with the possibility that an MSS capable of that feature did not need to synchronize to the full BW, long preamble at the beginning of the frame, but rather only on the DL subchannelized preamble at the beginning of the DL Subchannelization Zone. So an MSS may not have the BSID and frame number information normally needed for randomization of DL bursts when it tries to demodulate the SBCH_DLFP. We think it makes sense to reinitialize the randomizer at the beginning of the DL subchannlization zone to the same seed used in the regular DL subframe.

Suggested Remedy

On p. 153, line 50 insert the following text:

[In Section 8.3.3.1, modify the text above Figure 198 to:]

> On the downlink, the randomizer shall be re-initialized at the start of each frame with the sequence: 1 0 0 1 0 1 0 1 0 0 0 0 0 0 0. The randomizer shall not be reset at the start of burst #1. At the start of subsequent bursts the randomizer shall be initialised with the vector shown in Figure 198. The frame number used for initialization refers to the frame in which the downlink burst is transmitted.
>
> For a DL subchannelization zone (refer to Section 8.3.5.1.1) the randomizer is initialized in an equivalent manner. At the start of the DL subchannelized zone, the randomizer shall be re-initialized to the sequence 1 0 0 1 0 1 0 1 0 0 0 0 0 0 0. The randomizer shall not be reset at the start of the first burst in the CCH. At the start of subsequent bursts, the randomizer shall be initialized with the vector shown in Figure 198. The frame number used for intialization refers to the frame in which the subchannelized burst is transmitted and can be obtained from the SBCH_DLFP (refer to Table 222c).

Issue #5: ECC in the DL Subchannelization Zone (tied to comment 1062)

Explanation of Problem

At the end of page 157, line 32, it is still not clear how error control coding is handled for DL subchannelization for the OFDM PHY. We think it makes sense to do ECC in the DL subchannelization zone in the same manner as was done for the uplink, i.e. use the convolutional encoder only.

Suggested Remedy

On p. 153, line 50 insert the following:

> *[Modify the second last paragraph in Section 8.3.3.2.1 to:]*
>
> When subchannelization is applied ~~in the uplink~~, the FEC shall bypass the RS encoder and use the Overall
> Coding Rate as indicated in Table 213 as CC Code Rate. The Uncoded Block Size and Coded Block size may be computed by multiplying the values listed in Table 213 by the number of allocated subchannels divided by 16.

Issue #6: Pilot Modulation in the DL Subchannelization Zone (tied to comment 1063)

Explanation of Problem

At the end of page 157, line 32, it is still not clear how modulation of the pilot subcarriers is handled for DL subchannelization for the OFDM PHY. DL subchannelization was added with the possibility that an MSS capable of that feature did not need to synchronize to the full BW, long preamble at the beginning of the frame, but rather only on the DL subchannelized preamble at the beginning of the DL subchannelization zone. So it may not know the value for *k*, the symbol index relative to the beginning of the downlink subframe (see Section

8.3.3.4.2 in P802.16-REVd/D5). We think it makes sense to do pilot modulation in the DL subchannlization zone in the same manner as was done for the uplink, i.e. *k* represents the symbol index relative to the beginning of the burst.

Suggested Remedy

On p. 153, line 50 insert the following:

[Modify the second paragraph in Section 8.3.3.4.2 to:]

The value of the pilot modulation for OFDM symbol k is derived from wk. On the downlink the index *k* represents the symbol index relative to the beginning of the downlink subframe, unless the symbol is in the DL Subchannelization Zone (refer to Section 8.3.5.1.1). In the DL Subchannelization Zone, the index *k* represents the symbol index relative to the beginning of the burst. On the uplink the index *k* represents the symbol index relative to the beginning of the burst. On both uplink and downlink, the first symbol of the preamble is denoted by *k*=0. The initialization sequences that shall be used on the downlink and uplink are shown in Figure 204. On the downlink, this....

Issue #7: Tx Power in the DL Subchannelization Zone (tied to comment 1064)

Explanation of Problem

At the end of page 157, line 32, it is still not clear how the transmit power of the subchannelized allocations is specified for DL subchannelization for the OFDM PHY. To take advantage of the link budget benefits with subchannelization, we think it makes sense to boost the power for DL subchannelized burst allocations.

Suggested Remedy

On p. 158, after Section 8.3.6.3.9 insert the following:

8.3.7.4 Power control

[Modify the second paragraph in Section 8.3.7.4 to:]

When suchannelization is employed in the uplink, the SS shall maintain the same transmitted power density unless the maximum power level is reached. That is, when the number of active subchannels allocated to a user is reduced, the total transmitted power shall be reduced proportionally by the SS, without additional power control messages. When the number of subchannels is increased the total transmitted power shall also be increased proportionally. However, the transmitted power level shall not exceed the maximum levels dictated by signal integrity considerations and regulatory requirements. Subscriber stations shall report the maximum available power, and the normalized transmitted power.

When subchannelization is employed in the downlink, the BS may vary the power of individual subchannelized allocations to improve the link budget to particular MSS's. The transmitted power level

shall not exceed the maximum levels dictated by signal integrity considerations and regulatory requirements. Within a given DL subchannelized allocation the spectral flatness requirement as specified in 8.3.10.1.1 applies to all the energized subcarriers.