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Source(s)	Joël Demarty SEQUANS Communications.	joel@sequans.com
	Ambroise Popper SEQUANS Communications	ambroise@sequans.com
	David Castelow AIRSPAN Networks	dcastelow@airspan.com
	Rainer Ullmann Wavesat	rullmann@wavesat.com
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Abstract	Operational margins for DL link adaptation	
Purpose	Adopt changes.	
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Operational margins for DL link adaptation

Joël Demarty, Ambroise Popper (SEQUANS Communications)
David Castelow (AIRSPAN)
Rainer Ullmann (Wavesat)

1. Justification

Contribution C802.16maint-04/74 removed the mechanism of link adaptation in the standard, by which the SS was mandated to ask for a change of burst profiles based on its being inside CINR zones defined in the DCD message. Therefore control of the link is of the sole responsibility of the SS.

This raises the issue that a BS, and therefore a network operator, can not control the behaviour of the network. Two different strategies could be chosen by the base station:

1. Seek maximum capacity, and always try to put each SS in the best possible modulation, without any margin. This comes at the price of potential instability, because every time the CINR of the SS changes a little bit, it will request to change its modulation. This also costs uplink capacity
2. Seek maximum stability, by trying to put each SS in a more robust modulation than they could actually work with considering their current CINR. This enables to support fadings without loss of packets, but comes at the cost of less capacity.

A variety of strategies are available to the base station, depending on the deployment scenario, and these 2 are only examples. Having the SS sole responsible for DL link adaptation prevents the BS to define its own strategy, and its turn does not enable to adapt to different service levels.

Now, the fixed thresholds as were defined in 802.16-2004 have the drawback of not taking into account the different performance levels of each SS. If the BS imposes the same CINR entry and exit thresholds for all subscriber stations, then it has no way of controlling the actual margin that each SS has as compared to its own implementation. We suggest a mechanism for the BS to define operational margins, and therefore control the desired level of robustness of the link. This would be to define the entry and exit thresholds not as absolute CINR levels, but relative to the performance of the SS. We take as reference the SNR required to attain a BER after FEC of 10^{-6} (defined as the Receiver SNR in section 8.3.11.1) in the different coding schemes. Each SS determines its own Implemented Receiver SNR, and determines exit and entry thresholds accordingly.

2. Text changes

2.1. Definitions

Add to definitions p4, line 44:

3.27 Implemented receiver SNR: the minimum level of SNR required to reach a BER of 10^{-6} after FEC, as enabled by actual implementation, for a given modulation and coding scheme.

2.2. Figure 81

In section 6.3.10.1 p27

Delete lines 8-13 (i.e. re-instate previous text and re-instate Figure 81)

2.3. DCD encoding

In section 11.4.2, P130, modify table 362 from 802.16-2004 p663:

Table 362 - DCD burst profile encodings—WirelessMAN-OFDM

Name	Type	Length	Value
FEC code type	150	1	0 = BPSK (CC) 1/2 11 = 64-QAM (BTC) 2/3 1 = QPSK (RS+CC/CC) 1/2 12 = 64-QAM (BTC) 5/6 2 = QPSK (RS+CC/CC) 3/4 13 = QPSK (CTC) 1/2 3 = 16-QAM (RS+CC/CC) 1/2 14 = QPSK (CTC) 2/3 4 = 16-QAM (RS+CC/CC) 3/4 15 = QPSK (CTC) 3/4 5 = 64-QAM (RS+CC/CC) 2/3 16 = 16-QAM (CTC) 1/2 6 = 64-QAM (RS+CC/CC) 3/4 17 = 16-QAM (CTC) 3/4 7 = QPSK (BTC) 1/2 18 = 64-QAM (CTC) 2/3 8 = QPSK (BTC) 3/4 or 2/3 19 = 64-QAM (CTC) 3/4 9 = 16-QAM (BTC) 3/5 20–255 = Reserved 10 = 16-QAM (BTC) 4/5
DIUC mandatory exit ~~threshold~~margin	151	1	~~0-63.75 dB~~ -32 to 31.75 dB ~~CINR~~Margin compared to the SS' implemented receiver SNR 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~~margin	152	1	~~0-63.75 dB~~ -32 to 31.75 dB The minimum ~~CINR~~margin compared to the SS' implemented receiver SNR 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 disabled 1 = TCS enabled 2–255 = Reserved