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Re:	Response to Sponsor Ballot on IEEE802.16e/D8 document
Abstract	In this contribution, we suggest that some text description should be modified to make the matrix be uniform with the text description.
Purpose	To incorporate the text changes proposed in this contribution into the 802.16e/D8 draft.
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Corrections and clarifications to OFDMA LDPC Coding

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Overview

The design of 16e LDPC codes has overcome the problem of saving parity check matrices, and provided a very simply encoding and decoding scheme, and considered the "error floor" problem . Of course, these codes have the common merits of LDPC codes, such as simply decoding, high parallel degree and perfect performance near to Shannon limit. So these LDPC codes will have a bright prospect, and have a wide application to replace turbo codes.

In P802.16e/D8 , 24-column base matrix has been adopted, and dual-dialog structure corresponding to parity check bits also has been used. For the base model matrix of rate 1/2, 2/3 A and B , 3/4 A codes, the first column of the part corresponding to parity bits has adopted "a-0-a" structure. However, for the base model matrix of 3/4 B codes, the first column of the part corresponding to parity bits has adopted "0-a-0" structure.

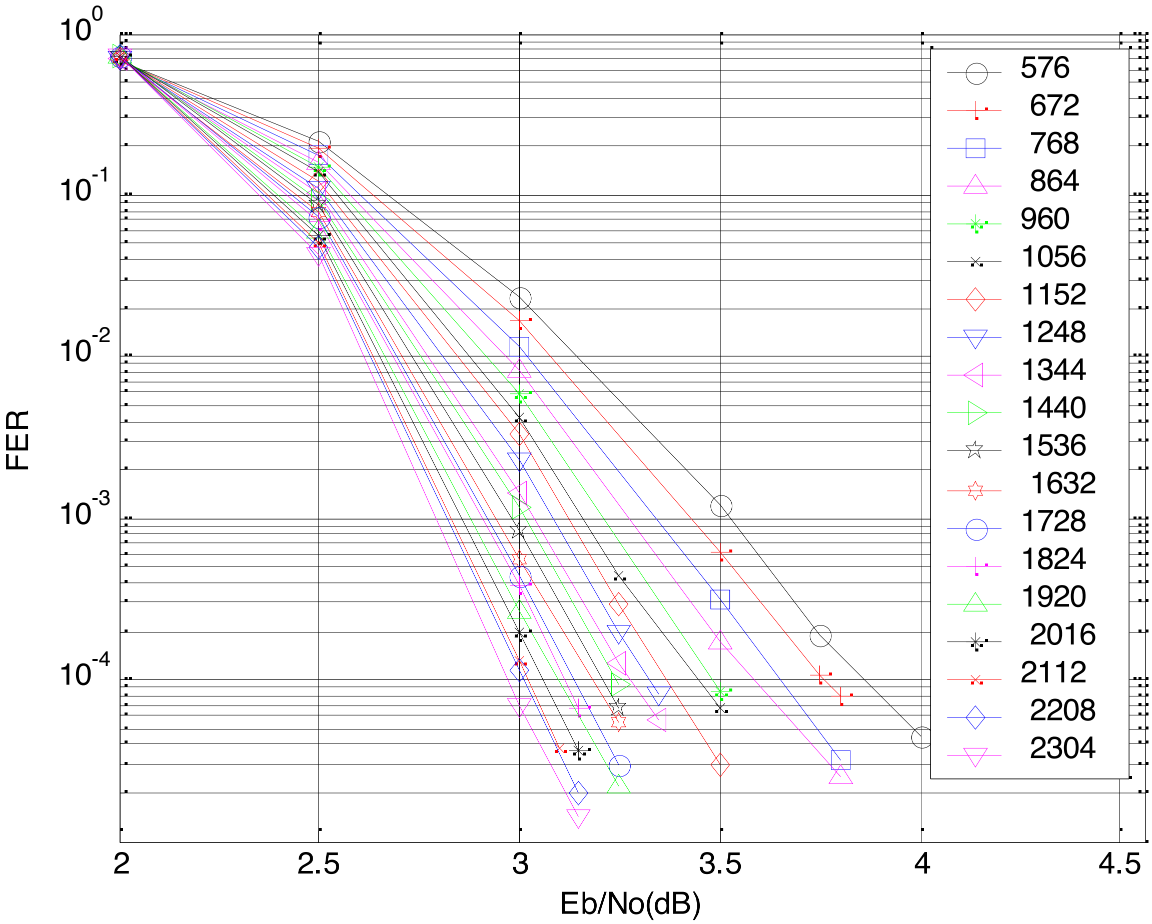
Method 1 in 16e draft can be completely used to finish the encoding process of rate 3/4 B codes. For method 2 invented by Richardson, if $\mathsf{f} = ET^{-1}B + D = z - p(x, k_b)$, method 2 also can be used to finish the encoding process of rate 3/4 B codes, here $p(x, k_b)$ has been defined in the formula 129b) of P802.16e/D8. We can prove the conclusion above. So, we can conclude that rate 3/4 B codes are uniform with encoding method in 16e draft.

However, in order to get better uniform form about LDPC base model matrices, we suggest that the base model matrix of rate 3/4 codes should be changed from "0-a-0" encoding structure to " a-0-a" encoding structure. Through careful selection and simulation, we can ensure that the text change will not affect the performance of original rate 3/4 B codes.

Simulation Results

Simulation results for the rate 3/4 code B families are shown in Figure 1. For the rate, code sizes considered are all 576-2304. The simulation conditions are: AWGN channel, BPSK modulation, max iterations times 50, using generic floating-point belief propagation. From the simulation results we can find that our codes overcome the "error floor" phenomenon, and the BER curve of them will descend more steeply. When SNR is high, our high girth method obviously obtained an improved performance.

The expansion factor *z* ranges from 24 to 96, as shown in Figures 1. The block size and the expansion factor are related by *n* = 24*z.



Recommended Text Changes:

In this contribution we propose two remedies to solve the problem.

Remedy #1:

Section 8.4.9.2.5.1 Code Description
At the beginning of the Page 475 of *P802.16e/D8* , suggested text changes about the base model matrix of
rate 3/4 B codes have been shown as following:

Rate 3/4 B code:

-1	81	-1	28	-1	-1	14	25	17	-1	-1	85	29	52	78	95	22	92	~~0~~ 20	0	-1	-1	-1	-1
42	-1	14	68	32	-1	-1	-1	-1	70	43	11	36	40	33	57	38	24	-1	0	0	-1	-1	-1
-1	-1	20	-1	-1	63	39	-1	70	67	-1	38	4	72	47	29	60	5	~~80~~ 0	-1	0	0	-1	-1
64	2	-1	-1	63	-1	-1	3	51	-1	81	15	94	9	85	36	14	19	-1	-1	-1	0	0	-1
-1	53	60	80	-1	26	75	-1	-1	-1	-1	86	77	1	3	72	60	25	-1	-1	-1	-1	0	0
77	-1	-1	-1	15	28	-1	35	-1	72	30	68	85	84	26	64	11	89	~~0~~ 20	-1	-1	-1	-1	0

Remedy #2:

In the "8.4.9.2.5.1 Code Description"

In the second paragraph of Page 473 of *P802.16e/D8*, suggested text change is shown as following:

In particular, the non-zero submatrices are circularly right shifted by a particular circular shift value. Each 1 in $\mathbf{H}'_{b_2}$ is assigned a shift size of 0, and is replaced by a *z*x*z* identity matrix when expanding to H. The two located at the top and the bottom of h_b are assigned equal shift sizes, and the third 1 in the middle of h_b is given an unpaired shift size. ~~The unpaired shift size is 0.~~

In the page 477 of *P802.16e/D8*, there is a sentence below formula (129i) as following:
Define $\phi = ET^{-1}B + D$ and with the parity check matrix as indicated $\phi = I$ or a cycle shift matrix.

In Page 477, 129e) should be uniform with 129b) , so $p(x, k_b)$ should be added as following:

$$\underline{P_{p(x,k_b)}}v(0) = \sum_{j=0}^{k_b-1}\left(\sum_{q=0}^{m_b-1} P_{p(q,j)}\right)u(j) \qquad (129e)$$