LDPC

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Notations

- n - Block size.
- Eb/No - Input SNR in db to maintain input BER between 10^{-2} to 10^{-3}.
- BER - output bit error rate.
- CDB - Number of correctly decoded blocks.
- T - Average time to decode a code block in seconds.
- Itr - Average number of iterations per block.

Sum Product Decode(Rate=0.75)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	5.5	0	100	0.032	1
	6.5	0	100	0.023	1
	7.5	0	100	0.021	1
8192	5.5	0	100	0.066	2
	6.5	0	100	0.050	1
	7.5	0	100	0.043	1
12288	5.5	0	100	0.10	2
	6.5	0	100	0.08	1
	7.5	0	100	0.065	1
16384	5.5	0	100	0.133	2
	6.5	0	100	0.111	1
	7.5	0	100	0.083	1

Sum Product Decode(Rate=0.80)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	5.5	0	100	0.037	1
	6.5	0	100	0.028	1
	7.5	0	100	0.025	1
8192	5.5	0	100	0.080	2
	6.5	0	100	0.058	1
	7.5	0	100	0.050	1
12288	5.5	0	100	0.118	2
	6.5	0	100	0.090	1
	7.5	0	100	0.075	1
16384	5.5	0	100	0.156	2
	6.5	0	100	0.122	1
	7.5	0	100	0.103	1

Sum Product Decode(Rate=0.85)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	5	0	100	0.056	2
	6	0	100	0.040	1
	7	0	100	0.033	1
8192	5	0	100	0.116	2
	6	0	100	0.090	1
	7	0	100	0.068	1
12288	5	0	100	0.186	3
	6	0	100	0.140	2
	7	0	100	0.101	1
16384	5	0	100	0.257	3
	6	0	100	0.192	2
	7	0	100	0.135	1

Sum Product Decode(Rate=0.9)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	5	0	100	0.087	3
	6	0	100	0.060	2
	7	0	100	0.049	1
8192	5	0	100	0.190	3
	6	0	100	0.139	2
	7	0	100	0.098	1
12288	5	0	100	0.332	3
	6	0	100	0.216	2
	7	0	100	0.147	1
16384	5	0	100	0.431	3
	6	0	100	0.285	2
	7	0	100	0.199	1

Sum Product Decode(Rate=0.95)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	-	-	-	-	-
8192	-	-	-	-	-
12288	4.5 5.5 6.5	0.0037 0 0	20 100 100	- 0.607 0.367	- 3 2
16384	4.5 5.5 6.5	0.0037 0 0	24 100 100	- 0.825 0.692	- 3 2

- n = 4096 and 8192 cycle free random matrix was not able to generate.

Min Sum Decode (Rate=0.75)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	5.5	0	100	0.0081	2
	6.5	0	100	0.0057	1
	7.5	0	100	0.0055	1
8192	5.5	0	100	0.01638	2
	6.5	0	100	0.01291	1
	7.5	0	100	0.01094	1
12288	5.5	0	100	0.02431	2
	6.5	0	100	0.01967	1
	7.5	0	100	0.01615	1
16384	5.5	0	100	0.03343	2
	6.5	0	100	0.02769	1
	7.5	0	100	0.02116	1

Min Sum Decode (Rate=0.8)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	5.5	0	100	0.00899	2
	6.5	0	100	0.00679	1
	7.5	0	100	0.00648	1
8192	5.5	0	100	0.01947	2
	6.5	0	100	0.01446	1
	7.5	0	100	0.01230	1
12288	5.5	0	100	0.02997	2
	6.5	0	100	0.02288	1
	7.5	0	100	0.01894	1
16384	5.5	0	100	0.03830	2
	6.5	0	100	0.03041	1
	7.5	0	100	0.02502	1

Min Sum Decode (Rate=0.85)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	5	0	100	0.01356	3
	6	0	100	0.00953	2
	7	0	100	0.00774	1
8192	5	0	100	0.02823	3
	6	0	100	0.02128	2
	7	0	100	0.01559	1
12288	5	0	100	0.04409	3
	6	0	100	0.03315	2
	7	0	100	0.02424	1
16384	5	0	100	0.06060	3
	6	0	100	0.04551	2
	7	0	100	0.03255	1

Min Sum Decode (Rate=0.9)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	5	0	100	0.02021	3
	6	0	100	0.01337	2
	7	0	100	0.01051	1
8192	5	0	100	0.04263	3
	6	0	100	0.02911	2
	7	0	100	0.02081	1
12288	5	0	100	0.06799	4
	6	0	100	0.04524	2
	7	0	100	0.03292	1
16384	5	0	100	0.09209	4
	6	0	100	0.06073	2
	7	0	100	0.04254	1

Min Sum Decode (Rate=0.95)

n	Eb/No	BER	CDB	T(sec)	Itr(/150)
4096	-	-	-	-	-
8192	-	-	-	-	-
12288	4.5 5.5 6.5	0.0075 0 0	0 100 100	- 0.12824 0.07325	- 4 2
16384	4.5 5.5 6.5	0.0072 0 0	0 100 100	- 0.16597 0.09975	- 4 2

- n = 4096 and 8192 cycle free random matrix was not able to generate.

Conclusion

- All the specification are matched for the rates upto 0.9.
- The specs are not met for rate = 0.95. The reason is use of random matrix. As number of rows in matrix starts decreasing the cycles starts building thus decreasing girth of the the graph.