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ANALYSIS AND DESIGN OF CONCATENATED CODING SCHEMES

Sneha soni[1], Jayprakash Upadhyay[2], Sachin Singh[3]

[1]M.Tech Student, ECE Department, SRIST, JABALPUR
[2]Asst. Professor, ECE Department, SRIST, JABALPUR
[3]Asst. Professor, Department, SRIST, JABALPUR

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Abstract -This paper centers around using the accessible assets in the remote correspondence framework to work on the exhibition of a high information rate FEC concatenated code without extra bandwidth or additional power. Moreover, the proposal recommends BCH + LDPC concatenated code as a high rate code for wireless communication systems. In light of the reproduction results and examination introduced in the postulation, it was observed that the proposed variety strategy worked on not just the exhibition of the proposed linked code yet additionally improved the presentation of other low redundancy FEC codes

Key Words: MPFEC, ECE, LDPC code, BCH code

1. INTRODUCTION

In communication system, it is needed to restrict the run length of zero to work with the synchronization. The expansion of error correcting codes is fundamental to keep up with the dependability of the frameworks. For radio frequency correspondence, somewhat messy simple channels are utilized in the field and at middle of the road frequencies for super-heterodyne gathering. The perplexing rendition of these sifting activities relates to passing the mind boggling envelope of the got signal through a messy simple complex channel, which is a course of the complex baseband adaptations of the simple channels utilized in the get chain. The blunder revising codes have the property which works with self-synchronization. The codes can proficiently work and work on the presentation of computerized correspondence frameworks. Multicarrier regulation, changes a framework with memory into a framework in the recurrence space, by breaking down the channel into equal narrowband channels, every one of which sees a scalar channel gain. The examining rate is picked to be a number several of the image rates. This gives a front end which yields a discrete sign.

2. PROPOSED MODEL

MPFEC is a method used to eliminate the effect of multipath propagation and at the same time utilize the multipath phenomenon to enhance the performance of the FEC techniques, hence saving significant channel resources which would otherwise be given to a feedback channel, without affecting their complexity or increasing the redundancy. The main idea of the MPFEC technique is to provide the sink with at least two copies of the transmitted signal in addition to the main one. Most of the diversity techniques rely on raising the size of the hardware or the spectrum and power to obtain the diversity at the receiver. Consequently, overhead should be applied to obtain three versions of the desired signal at the sink. The MPFEC may require an overhead under certain conditions; otherwise, there is no overhead.

3. ITERATIVE DECODING FOR BCH AND LDPC CODES

Simulations are performed and show that our choice does improve the BER in the error floor region. However, a little performance loss can also be observed in the waterfall region due to the rate loss. To compensate this BER performance degradation in the waterfall region, and also inspired by the success of iterative decoding, we propose a feedback-based iterative decoding for BCH and LDPC concatenated coding system. It is worth mentioning that one can of course employ a soft-decision decoding algorithm for BCH codes and result in an iterative decoding naturally; however, such approach will evidently lose the advantage of the fully developed hardware implementation of algebraic decoders.

From simulations, we sense that the outer BCH code decoder may feedback incorrect information to the LDPC code decoder when the error correcting capability of the BCH code is too small. This occurs especially when the BCH code decoder outputs a valid but wrong codeword. In principle, this probability is roughly inversely proportional to the error correcting capability of the BCH code. In order to ensure the exactness of the feedback information from the BCH code decoder to the LDPC code decoder, we have experimented three strategies.

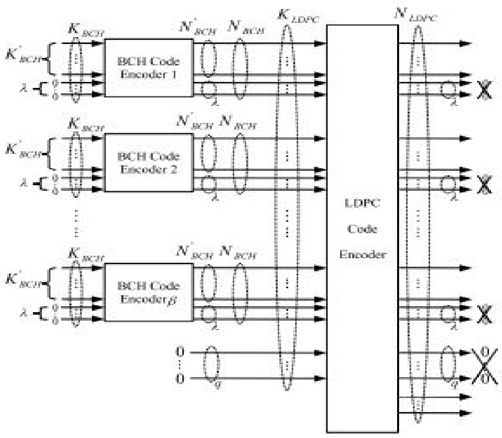

Figure 1: Block diagram of concatenated coding system

4. RESULTS & DISCUSSION

The simulation was selected to perform a comparison of results, comparing mainly the coded simulation results with uncoded simulation results in order to evaluate the performance of the MPFEC technique and the effect of the technique on the proposed concatenated code under three different systems. System performance is measured in terms of BER versus SNR. The BPSK, 4QAM, 16QAM and 64QAM modulation are employed under AWGN and Rayleigh channels. Any modulation scheme can be employed including M-PSK and M-QAM. The MPFEC technique is applied on RS, BCH and the proposed concatenated codes with different parameters.

Typically, the BCH code with two error correction capability outperforms the one that can only correct one error. However, utilizing two multipath signals in addition to the main signal improved the BER performance of the one error correction BCH code to perform better than the BCH code that has two error correction capabilities.

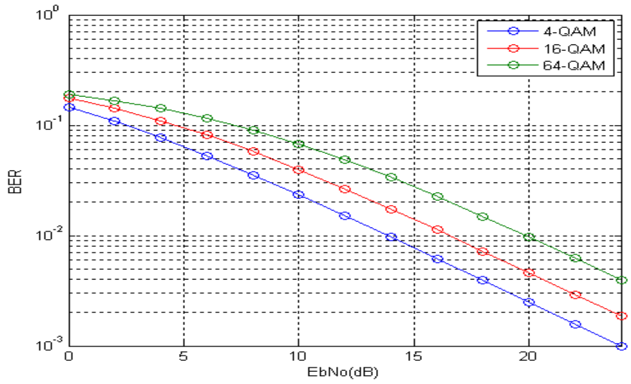

Figure 2: Comparison of BER v/s Eb/No for 4, 16 and 64 QAM for Rayleigh channel

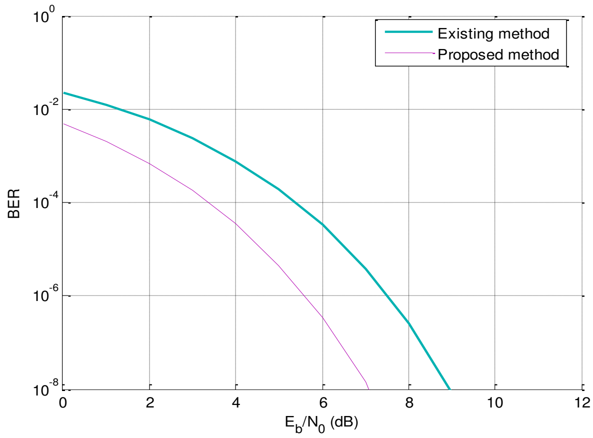

Figure 3: Comparison of BER of existing method and proposed method

5. CONCLUSIONS

The principal research point in this paper was to study and recognize the principle strategies used to foster a FEC code with low excess information and adequate execution for the wireless communication system. In this paper, a FEC code dependent on the concatenated code has been proposed in which two blocks FEC codes BCH and LPDC are linked to give a code which has low excess. The proposed code has repetition not exactly the other linked codes that are presently utilized in a wireless communication system.

6. REFERENCES

1. T. Richardson, A. Shokrollahi, and R. Urbanke, "Design of capacityapproaching low-density parity-check codes," IEEE Trans. Inform.Theory, vol. 47, pp. 619–637, Feb. 2001.

[8] T. Richardson and R. Urbanke, "The capacity of low-density paritycheck codes under message-passing decoding," IEEE Trans. Inform.Theory, vol. 47, pp. 599–618, Feb. 2001.

[9] N.Wiberg, "Codes and decoding on general graphs," Ph.D. dissertation, Dept. Elec. Eng., Univ. Linköping, Sweden, Apr. 1996.

[10] N.Wiberg, H.-A. Loeliger, and R. Kötter, "Codes and iterative decoding on general graphs," Euro. Trans. Telecommun., vol. 6, pp. 513–526, Sept. 1995.

[11] M. Luby, M. Mitzenmacher, M. A. Shokrollahi, D. A. Spielman, and V. Stemann, "Efficient erasure correcting codes," IEEE Trans. Inform.Theory, vol. 47, pp. 569–584, Feb. 2001.

[12] C. Berrou, A. Glavieux, and P. Thitimajshima, "Near Shannon limit error-correcting coding and decoding: Turbo-codes," in Proc. IEEE Int.Communications Conf., 1993.

[13] D. J. C. MacKay. (1998) Turbo codes are low-density parity-check codes.

[14] D. J. C. MacKay, R. J. McEliece, and J.-F. Cheng, "Turbo coding as an instance of Pearl‟s „belief propagation‟ algorithm," IEEE J. Select.Areas Commun, vol. 17, pp. 1632–1650, Sept. 1999.

[15] F. R. Kschischang and B. J. Frey, "Iterative decoding of compound codes by probability propagation in graphical models," IEEE J. Select. AreasCommun, vol. 16, pp. 219–230, Feb. 1998.

[16] M. Luby, M. Mitzenmacher, M. A. Shokrollahi, D. A. Spielman, and V. Stemann, "Practical loss-resilient codes," in Proc. 29th Annu. Symp.Theory of Computing, 1997, pp. 150–159.

[17] M. Luby, M. Mitzenmacher, and M. A. Shokrollahi, "Analysis of random processes via and-or trees," in Proc. 9th Annu. ACMSIAMSymp. Discrete Algorithms, 1998, pp. 364–373.

[18] M. Luby, M. Mitzenmacher, M. A. Shokrollahi, and D. Spielman, "Improved low-density parity-check codes using irregular graphs and belief propagation," in Proc. 1998 Int. Symp. Information Theory, p. 117.