

Differentiated Assignment of Extrinsic Information Based on Code Weights of Single Parity Check Product Code

Wonsun Bong*, Yong Cheol Kim*

*Dept. of Electrical and Computer Engineering, University of Seoul, Korea

gaam@uos.ac.kr, yckim@uos.ac.kr

Abstract—Constant amplitude multi-code CDMA (CAMC) removes the amplitude fluctuation in multi-code CDMA, by which the large power consumption of a power amplifier with a strict linearity can be avoided. The nature of CAMC is a recursive single parity check product code (SPCPC). CAMC for $N = 4^k$ is equivalent to k -dim SPCPC. As a top-level CAMC codeword is recursively constructed from lower-level codewords, log likelihood ratio (LLR), a priori information (API) and extrinsic information (EI) of upper-level codewords are obtained as a function lower-level codewords. The codewords of CAMC were found to have fixed code weights, $(N \pm \sqrt{2})/2$. In this paper, we show that differentiated assignment of EI in the iterated decoding can boost the BER performance. If any of the lower-level codewords have weights other than the fixed value, the EI associated with these erroneous lower-level codewords has lower confidence. EI from a wrong codeword is given lower weights in the computation of LLR, API and EI of the upper-level codeword. With differentiated assignment of EI, the BER performance improved by 0.1~0.3 dB.

Keyword—Weight Distribution, Turbo Code, Extrinsic Information, Single Parity Check Product Code



Wonsun Bong received BS and MS degree from Chungju University in 2009 and from University of Seoul in 2011, all in electrical engineering. He is currently pursuing Ph.D. at the department of electrical and computer engineering in the University of Seoul. His research interests are wireless communication and signal processing. He is a student member of IEEE.



Yong Cheol Kim received BS degree in electronics engineering from Seoul National University in 1981 and MS degree in electrical engineering from KAIST in 1983. He received the Ph.D. degree in electrical engineering from University of Southern California in 1993. From 1993 to 1996, he was with LG Innotek. Since 1993, he was with the department of electrical and computer engineering in the University of Seoul. His research interests are mobile communications and image processing. He is a member of IEEE, ACM, IEK, and KICS.