

Method of False Alarm Rate Control for Cyclic Redundancy Check-Aided List Decoding of Polar Codes

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Abstract : Polar coding is a novel example of error correcting codes, which can achieve Shannon limit at block length $N \rightarrow \infty$ with log-linear complexity. Active research is being carried to adopt this theoretical concept for using in practical applications such as 5th generation wireless communication systems. Cyclic redundancy check (CRC) error detection code is broadly used in conjunction with successive cancellation list (SCL) decoding algorithm to improve finite-length polar code performance. However, there are two issues: increase of code block payload overhead by CRC bits and decrease of CRC error-detection capability. This paper proposes a method to control CRC overhead and false alarm rate of polar decoding. As shown in the computer simulations results, the proposed method provides the ability to use any set of CRC polynomials with any list size while maintaining the desired level of false alarm rate. This level of flexibility allows using polar codes in 5G New Radio standard.

Keywords : 5G New Radio, channel coding, cyclic redundancy check, list decoding, polar codes

Conference Title : ICWCMCN 2017 : International Conference on Wireless Communications, Mobile Computing and Networking

Conference Location : Vienna, Austria

Conference Dates : June 14-15, 2018