Lower-Complexity Layered Belief Propagation Decoding Ldpc Codes

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SUMMARY

Researchers at UCLA have developed a novel Low-Density Parity-Check (LDPC) channel coding scheme for high-rate wireless communication systems, which in addition to outperforming conventional scheduling schemes, provides a low-complexity, partially parallel decoder for small-to-medium blocklength codes.

BACKGROUND

Due to their higher convergence speed and simplicity in iterative decoding, LDPC codes are often proposed as the channel coding solutions for modern wireless systems. This recent success of LDPC codes is mainly due to structures that allow partially-parallel decoders, resulting in significant higher throughput than conventional decoders. However, for small-to-medium blocklength codes, such as the IEEE 802.15.3c standard, current LDPC schemes cannot perform partially-parallel computations, dropping their performance to conventional coding methods.

INNOVATION

Researchers at UCLA have developed a low-complexity partially-parallel decoder for small-to-medium blocklength high-rate LDPC codes. Through implementing a scheduling scheme that updates variable nodes in a zigzag pattern, the design can be applied to any LDPC code while maintaining a partially-parallel structure. The proposed scheme performs with faster convergence speed and improved decoding capability compared to conventional decoding methods.

APPLICATIONS

Wireless Communication Systems

- High-rate LDPC code: mmWave WPAN (IEEE 802.15.3c)

ADVANTAGES

- Improved decoding capability
- Faster convergence speed
- High throughput
- Area efficient

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,489,957	07/16/2013	2008-239

RELATED MATERIALS

- Y.M. Chang, A.I. Vila Casado, M.F. Chang and R.D. Wesel, "Lower-Complexity Layered Belief Propagation Decoding of LDPC Codes," Proc. ICC 2008, Beijing, China, May, 2008.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

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OTHER INFORMATION

KEYWORDS

Channel Coding Scheme, Low Density Parity Check (LDPC), Layered Belief Propagation (LBP), Sequential Scheduling, Wireless LAN, Decoder, Information Theory

CATEGORIZED AS

- **Engineering**
  - Other

RELATED CASES

2008-239-0

▶ High-Throughput Communication System

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