

算法研究

不对称速率传输中网络编码与信道编码的联合设计

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摘要:

本文针对双向中继信道中不对称速率传输的情况进行了研究。在实际双向中继信道的通信传输中, 由于信道质量, 发射功率, 业务需求等条件的不对称, 双向信道的传输速率往往也是不对称的。本文提出了一种称为子集编码的方案, 将调制、物理层网络编码、信道编码联合起来设计, 使得较差信道的信道编码码字为较好信道的子集, 这样中继节点可以利用信道编码的线性性质对接收到的叠加信号直接进行译码, 从而使译码复杂度降低50%; 同时, 较好信道使用高阶调制, 较差信道使用低阶调制, 利用较好信道提高了系统的传输速率。仿真结果表明, 与对称速率传输相比, 本文提出的方案在提高系统有效性的同时, 又保证了系统的可靠性。

关键词: 网络编码; 不对称速率; 双向中继信道; 子集编码

A Joint Design of Network Coding and Channel Coding in Asymmetric Two-way Relay Channel

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Abstract:

In this paper we consider a scheme for asymmetric data transmission in two-way relay channel (TWRC) with physical layer network coding (PLNC). In practical communication, the transmission rate is always asymmetric because of the asymmetric channel quality, transmission power and rate requirement. We propose a scheme named subset coding, which combines channel coding and physical layer network coding with modulation to realize the asymmetric rate transmission in two-way relay channel. By using this scheme, the channel code which is adopted by the weaker channel is the subset of the one which is adopted by the stronger channel. In addition, the scheme takes advantage of the linearity of channel coding so that the relay node can decode directly the superposition signal into the XOR bits to obtain the information, which reduces the complication of the communication system. The simulation results show that the proposed scheme not only improves the information transmission rate, but also guarantees the reliability of the system.

Keywords: network coding asymmetric rate two-way relay channel subset coding

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