

论文

基于随机网络编码的无线广播重传方案及性能分析

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摘要:

针对自动重复重传 (ARQ) 机制在无线广播系统中吞吐量性能不佳的缺陷, 提出一种基于随机网络编码的广播重传方案RNC-ARQ。对于广播节点, 采用随机线性码对所有丢失包进行编码组合重传。对于接收节点, 当接收的编码包累积到一定数量后可通过解码操作恢复出原始数据。该方案可有效减少重传次数, 改善无线广播的吞吐量性能。基于Gilbert-Elliott模型描述的突发错误信道, 建立了信道状态和节点接收处理流程合并的多状态马尔可夫模型, 并以此为基础推导了RNC-ARQ方案的吞吐量闭合解。最后, 使用NS-2模拟器评估RNC-ARQ方案的性能, 结果表明在突发差错信道下, 基于随机网络编码重传方案的吞吐量优于传统的选择重传ARQ方案和基于异或编码的重传方案。

关键词: 广播; 马尔可夫模型; 吞吐量; 随机网络编码

A wireless broadcast retransmission scheme based on random network coding and its performance analysis

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Abstract:

A broadcast retransmission scheme based on the random network coding is put forward for the wireless broadcast system to conquer the deficiency of the ARQ scheme. In broadcast node, all lost packets are combined with the random linear codes for retransmission. In received nodes, original data can be obtained after enough combined packets are received and decoded. The proposed scheme can effectively reduce the number of retransmission as well as improve the throughput of broadcast system. Based on the Gilbert-Elliott channel model, a multi-state Markov model is generated by uniting the channel state with the reception mode of received nodes. The closed-form expressions are derived for the throughput of RNC-ARQ. Finally, NS-2 simulator is used to evaluate the performance of the proposed scheme. The results show that the proposed RNC-ARQ scheme is better than the SR-ARQ and XOR-ARQ scheme in terms of the throughput.

Keywords: broadcast Markov model throughput random network coding

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