

研究论文

基于模糊控制和MIMO的ad hoc网络STDMA协议

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摘要:

针对应用于ad hoc网络的空间时分多址接入(Space Time Division Multiple Access, STDMA)协议不能动态进行时隙分配以及不能充分利用空闲时隙的问题, 提出了一种基于模糊控制和多输入多输出(MIMO)技术的多址接入(MIMO-STDMA)协议. 该协议经过模糊逻辑控制器中模糊规则的判断和计算, 实现给网络中移动节点动态地分配时隙数目和帧长度. 移动节点采用预约跟MIMO的流控技术, 在分配时隙中利用全天线发送, 在未分配时隙中基于载波侦听进行预约发送. 仿真结果表明, MIMO-STDMA比STDMA能达到更高的网络吞吐量和时隙利用率.

关键词: ad hoc网络 空间时分多址接入 多输入多输出 模糊控制

STDMA protocol based on fuzzy control and MIMO for ad hoc networks

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Abstract:

In the traditional Space Time Division Multiple Access (STDMA) protocol, the time slot is not allocated dynamically and the idle slots potentially exist. To address the issue, based on fuzzy logic control and Multiple Input Multiple Output (MIMO) technology, a novel STDMA protocol (MIMO-STDMA) is proposed. In MIMO-STDMA, the number of slots and the frame length allocated to a mobile node are determined dynamically through the judgment and calculation based on regulation of the fuzzy controller. Utilizing the reservation and stream control gain of MIMO, in the allocated slots, a node employs full antennas to transmit data. On the contrary, in the unallocated slots the node reserves the transmission by 4-way handshaking with the carrier sense. Finally, simulations are conducted to evaluate the performance of the proposed protocol. The results show that the MIMO-STDMA outperforms the STDMA in terms of throughput and slot utilization.

Keywords: ad hoc networks STDMA MIMO fuzzy control

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