

IEEE 802.11 MAC帧服务时延分析和在拥塞控制中的应用

岳鹏, 文爱军, 赵瑞琴, 刘增基

(西安电子科技大学 综合业务网理论与关键技术国家重点实验室, 陕西 西安 710071)

收稿日期 修回日期 网络版发布日期 2008-6-4 接受日期

摘要 针对传统拥塞指示信号(例如平均队长)在无线自组织网络环境中不能有效指示网络拥塞的问题, 分析研究了IEEE 802.11协议MAC帧服务时延(FSD), 并给出了平均FSD与平均帧长、冲突概率以及饱和站数量之间的关系. 分析结果表明:当站的传输概率大于临界值时, FSD随传输概率或饱和站数量的增加急剧增大, 显示其对链路层拥塞较为敏感. 最后通过仿真验证了FSD作为拥塞指示信号的有效性, 与用平均队长指示网络拥塞的方法相比, FSD更能有效的指示网络拥塞, 当与TCP协议配合时, 能显著改善TCP连接的吞吐量, 降低丢包率.

关键词 [帧服务时延](#) [拥塞控制](#) [IEEE 802.11](#) [无线自组织网络](#)

分类号 [TN915.04](#)

Frame service delay analysis of IEEE 802.11 MAC protocol and its application in congestion control

YUE Peng, WEN Ai-jun, ZHAO Rui-qin, LIU Zeng-ji

(State Key Lab. of Integrated Service Networks, Xidian Univ., Xi'an 710071, China)

Abstract

For the problem that a traditional congestion signal such as the average length of a queue cannot indicate network congestion effectively in the ad hoc network, an analysis has been made of the frame service delay(FSD) of IEEE 802.11 MAC protocol, and the relation between the average FSD and the average length of the frame, the collision probability, and the number of saturated stations. Analytical results show that FSD increases sharply with the increase in transmission probability or the number of saturated stations if the transmitting probability of stations is larger than the critical one, and that FSD has a high sensitivity to the link congestion. Finally, the effectiveness of FSD as the congestion signal is validated by simulation. Compared with the average length of the queue, FSD can indicate network congestion more effectively. Together with TCP, the use of FSD as the congestion signal can prominently improve the throughput of TCP connection and decrease the ratio of packet loss.

Key words [frame service delay](#) [congestion control](#) [IEEE 802.11](#) [ad hoc network](#)

DOI:

通讯作者 岳鹏 pengy@xidian.edu.cn

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(765KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“帧服务时延”的 相关文章](#)
- ▶ [本文作者相关文章](#)

- [岳鹏](#)
- [文爱军](#)
- [赵瑞琴](#)
- [刘增基](#)