

Enhancing Limit MAC Performance for IEEE 802.11 Wireless LANs

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Abstract— To provide the best effort and real-time traffic services in IEEE 802.11 wireless LANs, the DCF (Distributed Coordination Function) and PCF (Point Coordination Function) protocols were proposed for the basic MAC (Medium Access Control) protocols and the enhanced MAC protocols such as EDCA (Enhanced Distributed Channel Access) and HCCA (Hybrid Coordination Function Controlled Channel Access) protocols for the differentiated QoS (Quality of Service) traffic services have been developed based on the DCF and PCF protocols. Unlike the PCF protocol and the enhanced MAC protocols based on the PCF protocol, as the number of nodes contending for the access to WM (Wireless Medium) increases, the MAC throughput of the DCF protocol and the enhanced MAC protocols based on the DCF protocol degrades exponentially and converges to zero. To deal with the problem of the performance degradation of the DCF protocol, we propose the simple however efficient modification of the DCF protocol by which each node in a backoff stage attempts to transmit its data frame with probability $1/n$ PIFS a (PCF Inter-Frame Space) period after the detection of idle channel state without performing the backoff procedure when n nodes exist in a IEEE 802.11 wireless LAN and are associated with the AP (Access Point) of the wireless LAN.

Keyword— IEEE 802.11 Wireless LAN, MAC, DCF, Performance, Throughput



Woo-Yong Choi was born in Busan, Korea 1970. He received the B.S., M.S. and Ph.D. degrees in industrial engineering from POSTECH (Pohang University of Science and Technology) in 1992, 1994 and 1997, respectively. From 1997 to 2001 he was a senior member of technical staff at Hyundai Electronics Industries Co., Ltd.. From 2001 to 2005 he was a senior member of technical staff at ETRI (Electronics and Telecommunications Research Institute). Since 2005 he has been with Department of Industrial & Management Systems Engineering at Dong-A University, where he is currently a professor. Currently he is working on enhancing MAC protocols applicable for Wireless LANs.