

Performance evaluation of wireless controller area network (WCAN) using token frame scheme

ABSTRACT

In this paper, a proposed new wireless protocol so-called wireless controller area network is introduced. WCAN is an adaptation of its wired cousin, controller area network protocol. The proposed WCAN uses token frame scheme in providing channel access to nodes in the system. This token frame method follows the example used in wireless token ring protocol which is a wireless network protocol that reduces the number of retransmissions as a result of collisions. This scheme based on CAN protocol allows nodes to share a common broadcast channel by taking turns in transmitting upon receiving the token frame that circulates around the network for a specified amount of time. The token frame allows nodes to access the network one at a time, giving 'fair' chance to all nodes instead of competing against one another. This method provides high throughput in a bounded latency environment. The proposed WCAN protocol has been developed and simulated by means of QualNet simulator. The performances of this proposed protocol are evaluated from the perspective of throughput, end-to-end delay and packet delivery ratio, and are compared against the IEEE 802.11 protocol. Simulation results show that the proposed WCAN outperforms IEEE 802.11 based protocol by 62.5 % in terms of throughput with increasing network size. Also, it shows an improvement of 6 % compared to IEEE 802.11 standard at a higher data interval rate.

Keyword: WCAN; IEEE 802.11; WTRP; Token frame