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Distance Dependent Service Differentiation of the IEEE 802.11e EDCA on Single Access Point Based WLAN Systems

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Abstract:

The IEEE 802.11e Enhanced Distributed Channel Access (EDCA) protocol allows class based differentiated Quality of service (QoS) in a wireless local area network (WLAN). Different fixed values of two certain parameters; contention window (CW) and arbitration inter frame space number (AIFSN), ensure higher or lower priority among this traffic classes, administrating different QoS in terms of throughput, delay, jitter etc. Previous simulation study illustrated, superior throughput and delay performance achieved by the highest priority voice traffic, compared to whatever achieved by the lowest priority background traffic; according to the deliberate design of the IEEE 802.11e EDCA protocol. In this paper, we present our simulation study of the EDCA mechanism; augmented with the International Telecommunication Union (ITU) indoor propagation model, solidifying the outcome by ensuring an indoor or semi-indoor setup like todays real world WLAN system's deployment scenarios. Simulation study shows that a node accessing highest priority traffic through an AP from a high distance at high data rate not only suffers performance drops itself but also severely bottlenecks the performance of other client nodes accessing traffics with comparatively lower priority, even if those nodes are at close proximity from the AP. However, the negative impact over other traffic accessing nodes are much lower but not fully negligible, when a client node through the AP, tries to access lower priority traffic from a large distance. Hence, the intended service differentiation over different traffic classes closely depends on whether all the client nodes are at a close proximity from the AP.