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Solving Hidden Station Problem using Self-Localization Asymmetric Full-Duplex MAC Protocol in WLANs

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Abstract: In recent years, Full-Duplex (FD) communication has become a potential technology for the future wireless local area network (WLAN). The FD Medium Access Control (MAC) enables both asymmetric and symmetric transmission behaviors. Asymmetric full-duplex transmission is used when only Access Point (AP) possesses the full duplex functionality, whereas mobile stations remain conventional half duplex devices. Symmetric full-duplex transmission is used when both AP and mobile stations have full duplex functionality. As a result, asymmetric full-duplex transmission is considered a useful fast solution to improve channel throughput by upgrading mobile devices. Asymmetric full-duplex transmission allows the up-link and down-link communications to take place simultaneously at an AP where the AP send a packet to one mobile station, while receiving a packet from another mobile station, in which both stations are hidden from each other. In order to achieve such an asymmetric full-duplex transmission, the AP must be able to control or guide the transmission of each station to avoid unnecessary collisions without substantial modification to the existing four-way handshake (RTS/CTS) as used in IEEE 802.11 Distributed Coordination Function. In this work, we aim to utilize the mobile station locations to assist the AP to perform proper asymmetric full-duplex transmissions as often to enhance the system throughput.

Keywords – Asymmetric Full Duplex, Hidden Station, MAC Protocol, IEEE802.11