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An Adaptive Opportunistic Transmission for Unlicensed Spectrum Sharing in Heterogeneous Networks

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Abstract : Efficient utilization of spectrum resources is a fundamental issue of wireless communications due to its scarcity. To improve the efficiency of spectrum utilization, the spectrum sharing for unlicensed bands is being regarded as one of key technologies in the next generation wireless networks. A number of schemes such as Listen-Before-Talk(LBT) and carrier sensor adaptive transmission (CSAT) have been suggested from this aspect, but more efficient sharing schemes are required for improving spectrum utilization efficiency. This work considers an opportunistic transmission approach and a dynamic Contention Window (CW) adjustment scheme for LTE-U users sharing the unlicensed spectrum with Wi-Fi, in order to enhance the overall system throughput. The decision criteria for the dynamic adjustment of CW are based on the collision evaluation, derived from the collision probability of the system. The overall performance can be improved due to the adaptive adjustment of the CW. Simulation results show that our proposed scheme outperforms the Distributed Coordination Function (DCF) mechanism of IEEE 802.11 MAC.

Keywords : spectrum sharing, adaptive opportunistic transmission, unlicensed bands, heterogeneous networks
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