

## A weighted hard combination scheme for cooperative spectrum sensing in cognitive radio sensor networks

### ABSTRACT

Multi-user spatial sensing diversity exploration through cooperation spectrum sensing greatly improves sensing performance. However, high communication overhead and energy costs for exchanging sensing results may limit its viability in a realistic large scale resource constraint network such as cognitive radio wireless sensor networks. This paper presents a Weighted Hard Combination (WHC) scheme that combines features of both quantized and hard combining schemes to minimize energy cost for reporting sensing result and improve primary user detection performance in cooperative sensing. We evaluate the effectiveness of the scheme through simulation. Performance comparison of the WHC scheme in terms of detection performance, reporting energy cost and reporting time ratio with conventional hard combination, soft combination and quantized schemes indicates viability of the scheme. The results indicate that the WHC scheme minimizes reporting energy cost by 70% and improves detection performance by 5.6% compared to the quantized 3-bits scheme.

**Keyword:** Cognitive radio sensor node; Cooperative spectrum sensing; Fusion centre; Probability of detection