Spectrum Sensing Techniques Based on Last Status Change Point Estimation for Dynamic Primary User in Additive Laplacian Noise

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Abstract

A real time scenario of dynamic primary user (PU) is considered in additive Laplacian noise. Two transitions or status changes of PU in the fixed sensing time are considered. The last status change point (LSCP) is estimated with maximum likelihood estimation (MLE) by using dynamic programming. We consider Cumulative Sum (CuSum) based weighted samples for detection. We consider three detection schemes such as sample mean detector, energy detection (ED) and improved absolute value cumulation detection (i-AVCD). We derive closed form expressions of detection probability (P_D) and false alarm probability (P_F) for all the three schemes. We present our results with receiver operating characteristic (ROC) for the considered schemes. We also present simulation results, which are closely matching with their analytical counterparts. We compare the ROC of the considered system with the ROC of conventional techniques. In the conventional techniques, all the samples in the sensing time are used for detection without LSCP estimation and weight. It is found that the considered system outperforms the conventional schemes.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Figures

Figure 1

ROC comparison of the LSCP estimation based CuSum to SMD, ED and i-AVCD at $N = 50$ and $\text{SNR} = 5$ dB.

Figure 2

ROC comparison of the LSCP estimation based CuSum to SMD, ED and i-AVCD with conventional schemes at $N = 50$ and $\gamma = -10$ dB.

Figure 3

ROC comparison of the LSCP estimation based CuSum to SMD for one PU status change and two PU status change at $\gamma = -5$ dB and $\gamma = -20$ dB, $N = 100$.