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# *Adaptive Multi-Coset Sampler*

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*With the exponential growth in the means of communications, modifying radio devices easily and cost-effectively has become business critical. Software radio (SW) technology brings the flexibility, cost efficiency and power to drive communications forward, with wide-reaching benefits realized by service providers and product developers through to end users. One of the main objectives of SW is to propose new technologies to design radio terminals and wireless infrastructure able to support hardware-independent, multi-service operations and are remotely reconfigurable. Furthermore, Cognitive radio continues to gain popularity as it adapts intelligently to the radio environment, thereby dynamically managing the spectrum. As a result, the spectrum changes continuously and rarely remain constant. Keeping the aspects of Software radio and Cognitive radio in mind, we propose a sampler that not only adapts to the changes in the input signal but is also remotely reconfigurable and is, therefore, not constrained by the inflexibility of hardwired circuitry.*

## *I. System model*

*We proposed non-uniform sampler named Adaptive Multi-Coset Sampler* (AMuCoS)*. It's shown Fig.1. It operates in blind mode, without any knowledge of the input signal's spectra and is based on the principle of MC sampling [1] except that instead of p input branches in case of MC sampling, the ASB Sampler has only one input reconfigurable branch [1].* Furthermore, the *ASB Sampler, and*

*Non-Uniform Spectrum Sensing Block* (NUSS) is introduced which *detects the spectra's bands location (spectral indexes) in the total bandwidth sampled. The Spectrum Changing Detector block compares the old value of the spectral indexes from its new value, calculated by the block NUSS. In the case of a spectrum changing. The spectral indexes' new value will replace the old and will be sent to blocks OASRS and "Reconstruction" as well as a statistical study in order to better control the switch. To reduce the average sampling frequency, the number of samples collected, and consequently the power consumption of the signal processing, we used the block OASRS (Optimal Average Sampling Rate Search).*

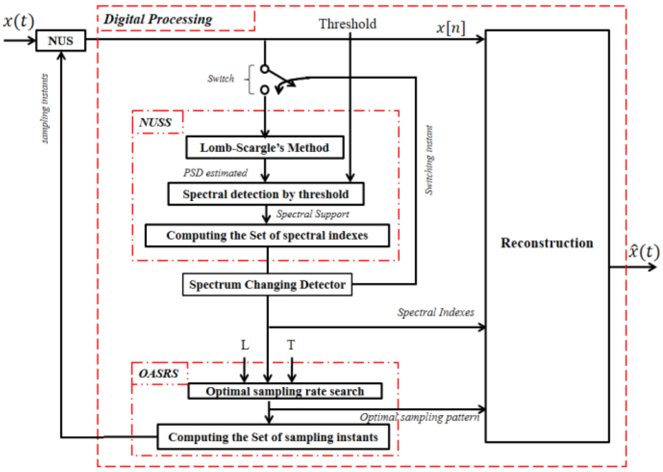


Fig. 1: Adaptive Single Branch Non-Uniform Sampler

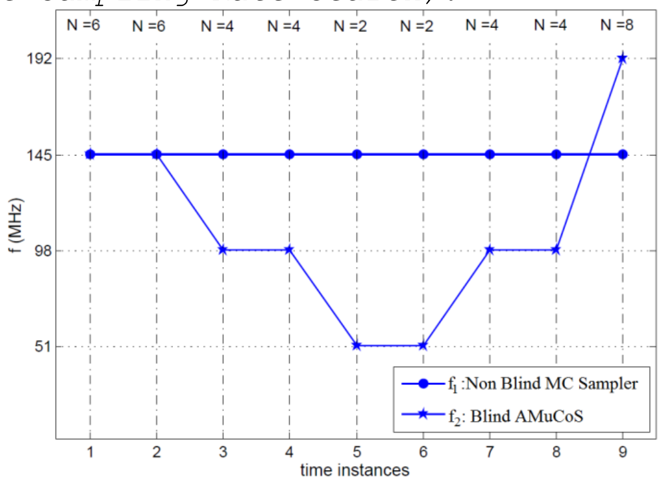


Fig. 2: Variation in f1 and f2 as N changes over time at an SNR = 50dB.

## *II. Numerical results*

*We consider a multiband signal with N bands with a maximum bandwidth of 10MHz. 16 QAM modulation symbols are used that are corrupted by the additive white Gaussian noise. The wideband of interest is in the range of B=[-300,300]MHz i.e. fnyq=600MHz. Throughout the simulations, we assume that the MC sampler has an optimal reconstruction for N=6 and perfect knowledge of the incoming signal while on the other hand, our proposed system operates in blind mode and therefore has no information regarding the spectral support and the number of bands.*

## *III. Conclusion*

*AMuCoS's average sampling frequency (f2, see Fig.2) depends only on the number of bands contained in the input signal x(t). It is much more efficient in terms of squared error than a conventional Multi-Coset sampling [1] architecture, when the spectrum of x(t) changes dynamically.*

## *Bibliography*


*[1] S. Traoré, B. Aziz, and D. Le Guennec, "Dynamic single branch non-uniform sampler," in DSP, Santorini-Greece,Proceedings of the International Conference on Digital Signal Processing, 2013.*