

# Energy Efficient A/D Conversion for Sequential Wideband Multichannel Spectrum Sensing in Cognitive Radio Network

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**Abstract**—Cognitive radio (CR) draws lots of attentions due to its efficient spectrum utilization by dynamic spectrum access. Due to hardware limitation, secondary user (SU) always divides the whole wideband into multiple subchannels, senses and accesses sequentially. Since wireless devices are always battery powered, energy efficiency is important. This paper analyzes the optimal parameters of ADCs to improve energy efficiency of the SU in cognitive radio networks (CRN). First, we study the state of the art analog-to-digital converter (ADC) to provide a power model, considering both sampling frequency and bit resolution. We then derive the sequential sensing energy optimization problem for ADCs and CRN energy efficiency optimization problem under detection and throughput constraints. Finally, we conclude how to select the optimal parameters for ADCs in CRN.

**Keyword**—Cognitive Radio, Sequential Sensing, Energy Efficiency, Power Model, Analog-to-Digital Converter (ADC)



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