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Cognitive and encrypted communications: state of the art and a new approach for frequency-agile filters


Yahya LAKYS<sup>1</sup>, Balwant GODARA<sup>2</sup>, Alain FABRE<sup>1</sup>

<sup>1</sup>Laboratoire IMS - ENSEIRB, UMR 5218 CNRS, 1 Avenue du Dr. Schweitzer, BP 99,  
Talence, 33402, FRANCE

e-mails: yahya.lakys@ims-bordeaux.fr, fabre@ims-bordeaux.fr

<sup>2</sup>Institut Supérieur d'Electronique de Paris, 28 rue Notre Dame des Champs,  
Paris, 75006, FRANCE

e-mail: bgodara@isep.fr

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 [Authors](#)



[elektrik@tubitak.gov.tr](mailto:elektrik@tubitak.gov.tr)

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**Abstract:** Several communication techniques are investigated in the first part of this paper: software radio, cognitive radio and encrypted communications. State of the art of research on agile and reconfigurable filters, passive as well as active, necessary for transceivers is then made and various tables for comparison are given. In the third part, a new theory for a 2<sup>nd</sup>-order frequency-agile filter is introduced. The center frequency of the filter is proportional to the gain of a feedback amplifier and thus can be tuned over a wide frequency range. This new theory is thereafter generalized to the n<sup>th</sup>-class leading to a center frequency proportional to  $(A)^{n/2}$ . Simulation results of band pass agile filters in current mode and made from second-generation current controlled conveyors (CCCII+) in 0.25  $\mu$  m SiGe BiCMOS technology are given for  $n = 1$  and  $n = 2$ . These simulation results along with results of measurements carried out on the fabricated filters entirely confirm the new approach. They also highlight the improvements to be expected for cognitive and encrypted communications.

**Key words:** Active filters, cognitive radio, current controlled conveyors, frequency agile filters

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