Military Technical College
Kobry El-Kobbah,
Cairo, Egypt

9th International Conference
on Electrical Engineering
ICEENG 2014

IL053:

'All-silicon' Tunable Cavity Filter Technology for Software Defined Radios

By:
Muhammad Shoaib Arif

Abstract:
The idea of software defined radios (SDR) has now been around for several years and there have been extensive efforts in this field especially for military communications. The vision is to have a single reconfigurable radio with multi-band and multi-standard compatibility that can operate effectively in dense electromagnetic radiation environments while having the frequency agility needed to communicate using multiple waveforms in rapid succession. The development of a truly reconfigurable, next-generation SDR is still far from complete. One key area requiring innovation is its reconfigurable RF front-end (RFFE) design, mainly due to the non-availability of a technology for realizing a low-loss, compact, and continuously-tunable broadband filter with low power consumption. In this lecture, the performance of the existing tunable filter technologies will be briefly discussed in the light of SDR requirements. It will be shown that while every technology has its merits and limitations, a common shortcoming is the lack of a simultaneous low-loss (high unloaded quality factor 'Qu') and high tuning ratio while keeping a mobile form factor. Finally, a new "all-silicon" tunable cavity filter technology will be introduced. This all-silicon tunable filter technology exploits the precision associated with micro-fabrication, along with the accurate movement of integrated RF MEMS to demonstrate a simultaneous low-loss ($Qu \geq 1000$) and wide tuning ($\geq 1{:}2$) filter. The performance of some technology demonstration devices will be presented to show that this all-silicon filter technology provides an appropriate solution for realizing compact, low cost, system-on-chip (SoC) compatible RFFE suitable for microwave SDR applications.

- *National University of Sciences and Technology, Pakistan*