

SESSION 4 – TAPA II Frequency Synthesizers and Oscillators

Thursday, June 17, 1:30 p.m.

Chairpersons: P. Kinget, Columbia University
M. Nagata, Kobe University

4.1 — 1:30 p.m.

A Σ - Δ Fractional-N Synthesizer with a Fully-Integrated Loop Filter for a GSM/GPRS Direct-Conversion Transceiver, I.-C. Hwang, H.-I. Lee*, K.-S. Lee, J.-K. Cho, K.-S. Nah and B.-H. Park, Samsung Electronics Co., Ltd., Gyeonggi-Do, Korea, *Purdue University, IN

This paper presents a fractional-N synthesizer with a 3-bit 4th-order interpolative S-D modulator for a GSM/GPRS direct conversion transceiver. With an integrated VCO and an integrated loop filter, the synthesizer achieves the phase noise performances less than -78dBc/Hz at close-in offset and less than -116dBc/Hz at 400KHz offset. The chip was fabricated and evaluated in a 0.35 μ m SiGe BiCMOS process.

4.2 — 1:55 p.m.

A 4GHz Fractional-N Synthesizer for IEEE 802.11a, H.-M. Chien, T.-H. Lin, B. Ibrahim, L. Zhang, M. Rofougaran, A. Rofougaran and W.J. Kaiser*, Broadcom Co., *UCLA, Los Angeles, CA

Phase noise of the Fractional-N Synthesizer depends critically on the linearity of its building blocks. In this research, new design methods are shown to directly improve its linearity. This includes a new re-timing scheme that effectively reduces phase noise for multi-modulus dividers. Further reductions in phase noise result from introduction of a high linearity CMOS charge pump. Measurement results verify the concept and demonstrate low phase noise performance at 4GHz.

4.3 — 2:20 p.m.

Standing Wave Oscillators Utilizing Wave-Adaptive Tapered Transmission Lines, W. Andress and D. Ham, Harvard University, Cambridge, MA

We introduce a novel standing wave oscillator (SWO) utilizing a tapered transmission line adapted to the position-dependent amplitudes of standing waves. The tapered line exploits the core property of standing waves to enhance Q and lower phase noise, demonstrating the benefits of wave-based oscillators. The phase noise of a fully-integrated 15GHz MOS SWO prototype with the tapered line is about 8dB superior to that of a uniform-line SWO over a wide range of offset frequencies.

4.4 — 2:45 p.m.

A 1.8 GHz LC VCO with 1.3 GHz Tuning Range and Mixed-Signal Amplitude Calibration, A. Berny, A. Niknejan and R. Meyer, University of California, Berkeley, CA

A 1.8 GHz LC VCO designed in a 0.18 μ m CMOS process achieves a very wide tuning range of 73% and measured phase noise of -123.5dBc/Hz at 600kHz offset from a 1.8GHz carrier while drawing 3.2mA from a 1.5V supply. A novel amplitude calibration technique used to stabilize performance across the wide band of operation does not degrade the VCO phase noise and consumes negligible power and area.

Break 3:10 p.m.