SESSION 20 – TAPA III
Oscillators and Dividers

Friday, June 16, 3:25 p.m.
Chairpersons: F. Dai, Auburn University
H. Yamazaki, Fujitsu Laboratories Ltd.

20.1 – 3:25 p.m.
A 20-GHz Injection-Locked LC Divider with a 25-% Locking Range, T. Shibasaki, H. Tamura*, K. Kanda*, H. Yamaguchi*, J. Ogawa*, T. Kuroda, Keio University, Yokohama, Japan, *Fujitsu Laboratories Ltd., Kawasaki, Japan

A 20-GHz injection-locked LC divider is described. A Miller divider topology was employed along with a coupling circuit to maximize the locking range. A test chip designed in a 90-nm CMOS technology operates at 20 GHz with 25-% locking range while consuming 6.4 mW of power.

20.2 – 3:50 p.m.
Coupled Inverter Ring I/Q Oscillator for Low Power Frequency Synthesis, J. Xu, S. Verma, T.H. Lee, Stanford University, Stanford, CA

A novel 12-stage VCO with in-phase and quadrature outputs at the 3rd harmonic of the oscillating frequency is presented. It employs coupled inverter rings. A new linear model of coupled inverter rings is developed to identify all possible oscillating modes and their frequencies using the Barkhausen criterion. A frequency synthesizer implemented in 0.18um CMOS with such a VCO has wide tuning range, and consumes only 2.8mA from a 1.5V supply to generate 2.4GHz differential I/Q outputs.

20.3 – 4:15 p.m.
Injection-Locked Frequency Dividers Based on Ring Oscillators with Optimum Injection for Wide Lock Range, A. Mirzaei, M.E. Heidari, R. Bagheri, S. Chehrazi, A.A. Abidi, University of California, Los Angeles, CA

Divide-by-2 and divide-by-6 ring oscillators use multi-phase injection to operate from near DC to 1.7 and 1.2 GHz input frequencies, respectively. In 0.13-µm CMOS, the circuits consume 0.25 mA per stage.

20.4 – 4:40 p.m.
A Single-Tank Dual-Band Reconfigurable Oscillator, R. Gharpurey, T.-L. Hsieh, S. Venkatraman*, University of Texas, Austin, TX, *Texas Instruments Inc., Dallas, TX

An area-efficient oscillator topology for dual-band applications is presented. The oscillator can be configured to operate in one of two states with distinct oscillation frequencies by reconfiguration of negative-transconductance cores that excite the oscillator tank. The oscillator operates at nominal bands of 2.9-GHz and 6.5-GHz. Phase noise performance is presented for both bands. The oscillator is implemented in a 90nm digital CMOS process.

20.5 – 5:05 p.m.
A 40-GHz Wide-Tuning-Range VCO in 0.18-µm CMOS, J.-C. Chien, L.-H. Lu, National Taiwan University, Taipei, Taiwan

A 40-GHz wideband VCO is demonstrated in a standard 0.18-µm CMOS technology. In order to achieve wide tuning range at millimeter-wave frequencies, a non-uniform standing-wave VCO with a switched-transmission line architecture is proposed. By switching the length of the transmission line, a frequency tuning range of 7.5 GHz is achieved for the 40-GHz VCO design while maintaining a phase noise better than -96 dBc/Hz at 1-MHz offset.