CMOS Voltage Control Oscillator for Phase Locked Loop using 28nm Technology

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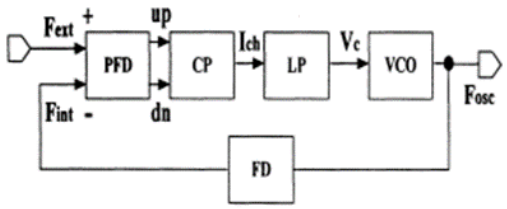
Abstract - In this paper, a new delay cell of the voltage-controlled oscillator (VCO) is proposed. It utilizes the skill that decreases the transient time to achieve the wider operating frequencies, lower phase noise and lower power supply noise. The structure of the VCO is implemented in the dual[1]delay path techniques. The operating frequency of the VCO is 1.4 GHz.

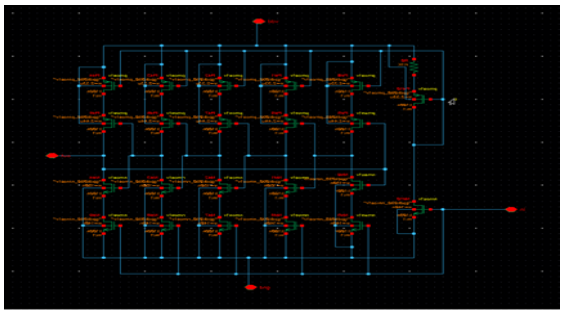
INTRODUCTION



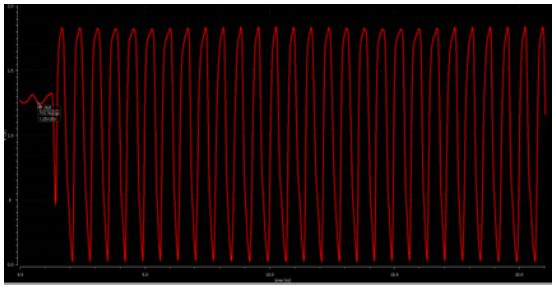
Phase locked loop (PLL) can be widely used for data transmission systems and mobile communication systems. As shown in Fig. 1, the PLL consists of five blocks: a phase frequency detector (PFD), a charge pump (CP), a loop filter (LF), a voltage-controlled oscillator (VCO) and a frequency divider (FD).

Voltage-controlled oscillators is an oscillator with an output signal whose output can be varied over a range, which is controlled by the input DC voltage Voltage-controlled oscillators (VCOs) are critical building blocks in phase-locked loop (PLL). Conventionally, there are several ways to implement the VCO: as an LC tuned oscillator, a relaxation oscillator (also called a multivibrator) and a ring oscillator. Some critical parameters of the PLL, such as speed, timing jitter, spectral purity, power dissipation, tuning range and the linearity of the input-output (I/O) curve strongly depend on the VCO performance. Recently, the increasing demand for lower cost and higher integration, CMOS VCOs have been continuously studied and enhanced. Here we use the 5 stages current starved VCO. Many CMOS VCOs have challenged the maximum operating frequency of several giga hertz.

CIRCUIT DESIGN & WAVEFORM:



Schematic of 5 stage CSVCO (Ref. No. 2)



Waveform of VCO (Ref. No. 2)

REFERENCE PAPERS:

1. Kuo-Hsing Cheng', Shu-Chang Kuo2, Chia-Ming Tu3 - A LOW NOISE, 2.0 GHz CMOS VCO DESIGN from IEEE Publications.

2. Aswin Udayan, Candice Darvin, Fyna Francis, Godwin Varghese - Design of Digital Phase Locked Loop in 90nm CMOS Technology (VCO Part) from Federal Institute of Science And Technology (FISAT).