A Tail-Current Modulated VCO with Adaptive-Bias Scheme
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1. Research Background
   Effects of Phase Noise
   Transceiver Power Budget

   AIM: High performance VCO with minimum area/power overhead.

2. Design for High Performance

   Class-C VCO
   Tail-Feedback VCO

   Enforcing Noise
   VCO

   Tx

   Rx

   M1
   M2
   Cbias
   Vbias
   Vbias
   Vbias
   Enf = 10log Fomax - Fom
   Fomax = 174 + 10log 2
   Pow
   Fom

   Isolating the noise generated by active circuitry facilitates
   fair comparison of various VCO architectures.

   Class-C VCO
   Tail-Feedback VCO

   Can be reduced without increasing transistor noise.

3. Reliability Issues

   Small Φ required for high efficiency.
   Vbias must be reduced for small Φ.
   VCO fails to start-up at low Vbias.
   The proposed adaptive bias scheme achieves:
   Reliable start-up.
   Enhanced DC-RF conversion efficiency.
   These goals are achieved with very little overhead.

4. Proposed VCO with Adaptive-Bias

   Schematic Diagram

   Simulation Results

   High Vbias (> Vth) during start-up.
   Vbias is gradually reduced for optimum enhancing efficiency.

5. Tail-Noise Suppression

   Performance comparison.

6. Results and Conclusions