Summary:

The designed Wilson current mirror based folded Cascode OTA was biased at 1.8V power supply voltage using CMOS technology of 0.18μm with the BSIM3V3 level 49 MOSFET model.

The circuit denotes an offset voltage of 0.05V, an input-output swing -1.8V/+1.5V,a Slew Rate of 160V/μS, and an input common-mode range close to supply rail ±1.8V. Designed Wilson Mirror base Folded Cascode OTA achieves a gain of 52dB and a wide bandwidth of 390 MHz with phase margin of 50 degrees.

Folded cascode OTA based on Wilson mirror has a limited output swing, because the maximum output voltage is set lower than: $V_{DD} + V_T + 2V_{ds,sat}$ so, we use cascode current mirror in order to restore this fall to $+2V_{ds,sat}$ and finally we achieved input-output swing -1.8V/+1.8V.

Based on Folded Cascode OTA, designed an integrated second order active Gm-C CMOS IF band pass filter for Dual Band Receiver, operating at center Frequency(10.6MHz IF for FM Band and 70MHz IF for GSM Band IF) range. The performances of the filters designed are analyzed using various parameters like center frequency, gain, bandwidth, Q, and S-parameters.

The ac responses of the 2nd order Gm-C dual-band IF Band Pass filter provides high Q (13.72 for GSM Band and 6.12 for FM Band) with bandwidth (5.10MHz for GSM Band and 1.73MHz for FM Band) and good gain (4.31 for GSM Band and 4.45 for FM Band).

The performances of the filters designed are also analyzed with 10% supply voltage and Temperature variations.

Layout represents the masks that are used to fabricate an integrated circuit. It describes a layout design in terms of files, cells & mask primitives. On the layout level, the

component parameters are totally different from schematic level. So it provides the facility to the user to analyze the response of the circuit before forwarding it to the time consuming & costly process of fabrication. There are rules for designing layout of a schematic circuit using which user can compare the output response with the expected one.

Extract creates SPICE (Simulation Programme with IC Emphasis) compatible circuit net lists from layouts. It can recognize devices, sub circuits, and the most common device parameters, including resistance, capacitance, device length, width, and area.

Monte Carlo analysis provides an accurate and powerful method for parametric yield estimation. The principle of Monte Carlo analysis can be defined as the generation of circuit figure-of-merit distributions as a function of statistically varying device model parameters that accurately reflect manufacturing process variations. Variations of physical parameters (e.g. oxide thickness or doping concentration) lead to variations of electrical parameters, like threshold voltage or gate capacitance. In turn, this affects the performance of circuits as it changes gate delays or leakage currents. By performing Monte-Carlo (MC) simulations on transistor level, the effect of global variations on the circuit behavior can be explored. Probability distributions for the varying device parameters serve as input for Monte-Carlo simulations. The distributions are based on measured statistics of the manufactured transistors. Therefore, IC manufacturers add Process Control Monitoring (PCM) structures on the scribe-line of the wafers.

The S-parameter simulation is performed for the 2nd order Gm-C dual-band IF Band Pass filter for impedance matching of 50 ohms on input and output of the filter. The S-parameters are found by considering the filter structures as two port network.
S-parameters found are input return loss in dB (S_{11}) and forward voltage gain in dB (S_{21}).

The S-parameter simulation of the 2nd order Gm-C dual-band IF Band Pass filter shows that the forward voltage gain (S_{21}) are at maximum (-1.56dB for GSM Band and -

0.71dB for FM Band) at the center frequency of the filters and the losses (S_{11}) are at minimum (-37.23dB for GSM Band and -50.07dB for FM Band) at the center frequency of the filters. The designed filter has tuning ratio 6.6 and suitable for IF channel selection of Wireless System with power consumption 575 μw.