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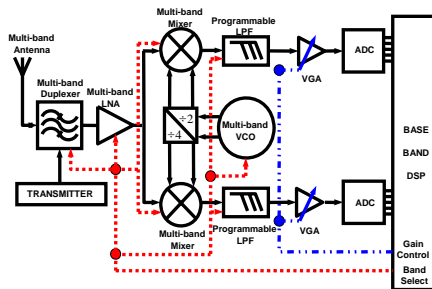
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**OVERVIEW**

The requirements of the future multi-standard mobile receiver systems are small size, less weight, low power consumption and lower cost with increased functionality and increased battery life. The mobile devices have been widely used for multiple functions that need a high data rate and global mobility, which can be satisfied with co-existence and handover between the different standards. Hence, the recent research in the wireless communication has been towards achieving a multi-standard terminal, integrated in low-cost silicon technologies that can communicate efficiently using the multiple standards such as GSM/DCS/PCS/UMTS.



**MULTI-STANDARD MOBILE RECEIVER**

Research indicates that the currently available multi-standard receivers use parallel receiver architectures. The current research trend is to merge the parallel receiver paths into a single multi-standard wireless receiver. To add the multi-standard feature to a wireless receiver architecture, the VCO needs to have low power consumption, low phase noise with full integration and reconfigurability. The currently available CMOS voltage controlled oscillators (VCOs) are fully integrated but have limited tuning range and large phase noise and power consumption. As a consequence, designers have been forced to use the off-chip components, making it unsuitable for a single-chip fully integrated multi-standard mobile receiver architecture.

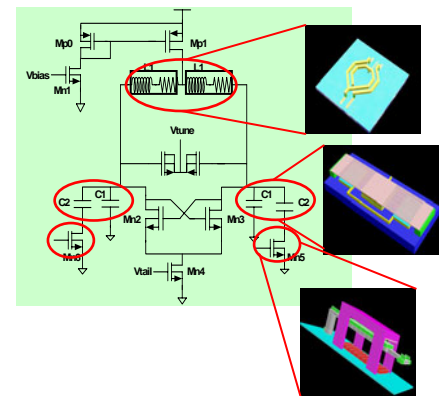
**PROJECT DESCRIPTION**

This research involves the design and implementation of a reconfigurable VCO for a multi-standard receiver that satisfies the low power and low phase noise requirements. This will be achieved by replacing the off-chip components with the MEMS components.

Micro Electro Mechanical Systems (MEMS) has drawn interest among researchers to implement RF Integrated Circuit (RFIC) components.

Existing research indicates that the MEMS based RF components such as L and C can achieve very high Q. The advantages of MEMS are low cost, low power consumption, higher performance, reduced size and weight and above all compatibility with CMOS technology

In this research project, MEMS components such as low-power switches, variable capacitors with high Q and wide tuning range and high Q inductors will be designed to achieve a single chip, low power, low phase noise VCO suitable for the multi-standard mobile receiver architecture. This will improve the Signal-to-Noise Ratio (SNR) of the complete multi-standard receiver system. The impact of MEMS noise on the VCO performance and the VCO performance on complete multi-standard RF front-end will be analysed. The SNR improvement can be traded for the Bit-Error-Rate (BER) improvement or the power reduction in the multi-standard mobile receiver.



**RECONFIGURABLE VCO**

**PERFORMANCE**

The following table presents the performance summary of the reconfigurable VCO:

| Parameter      | Result             |
|----------------|--------------------|
| Technology     | 0.25µ SOS and MEMS |
| Supply voltage | 2V                 |
| Frequency      | 1.8 GHz            |
| Core current   | 6mA                |
| Power          | 12mW               |
| Phase noise    |                    |
| @600kHz        | -125 dBc/Hz        |
| @1MHz          | -130 dBc/Hz        |
| @3MHz          | -141 dBc/Hz        |

**FURTHER INFORMATION**

For more information, please contact  
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