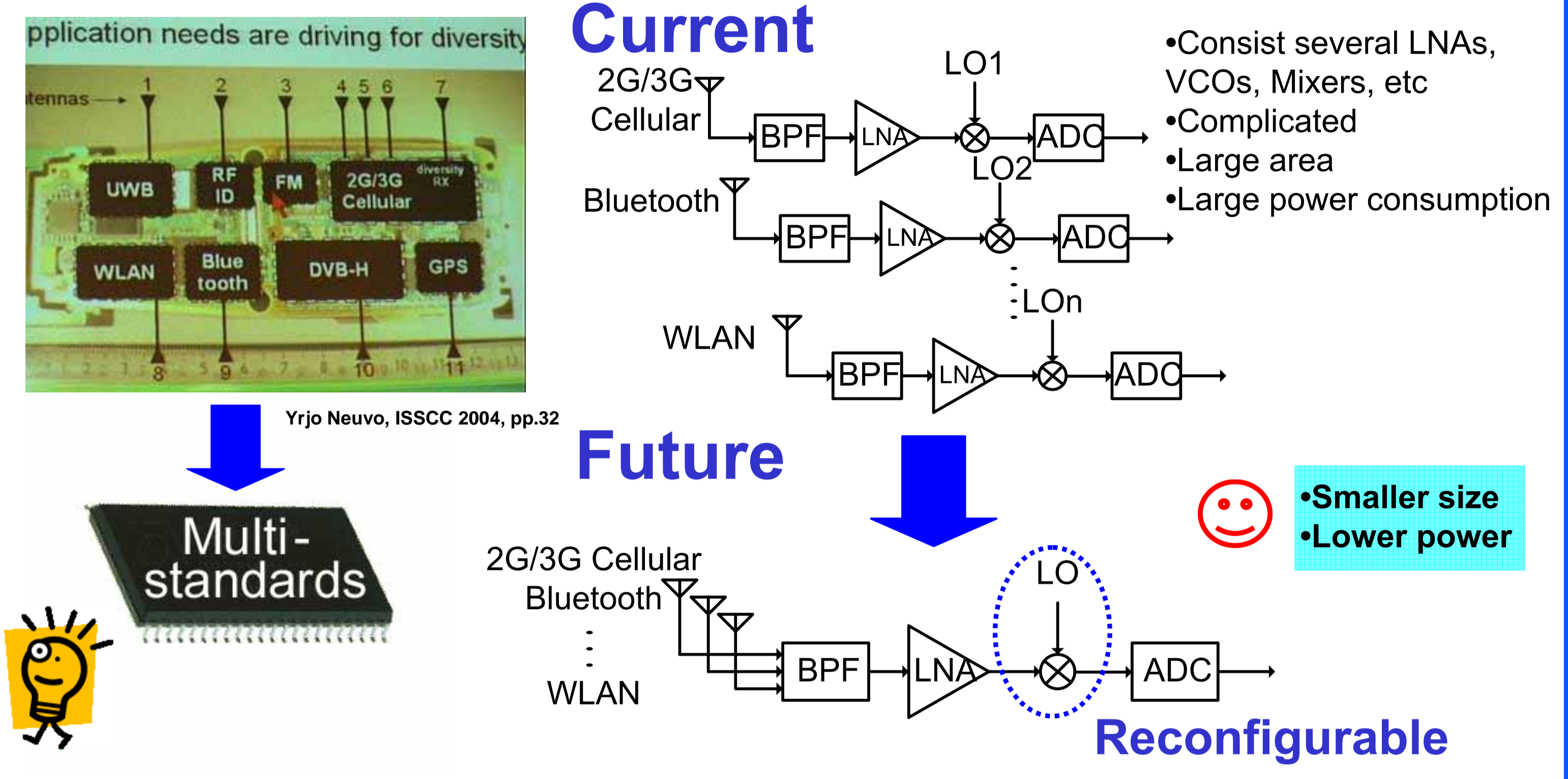


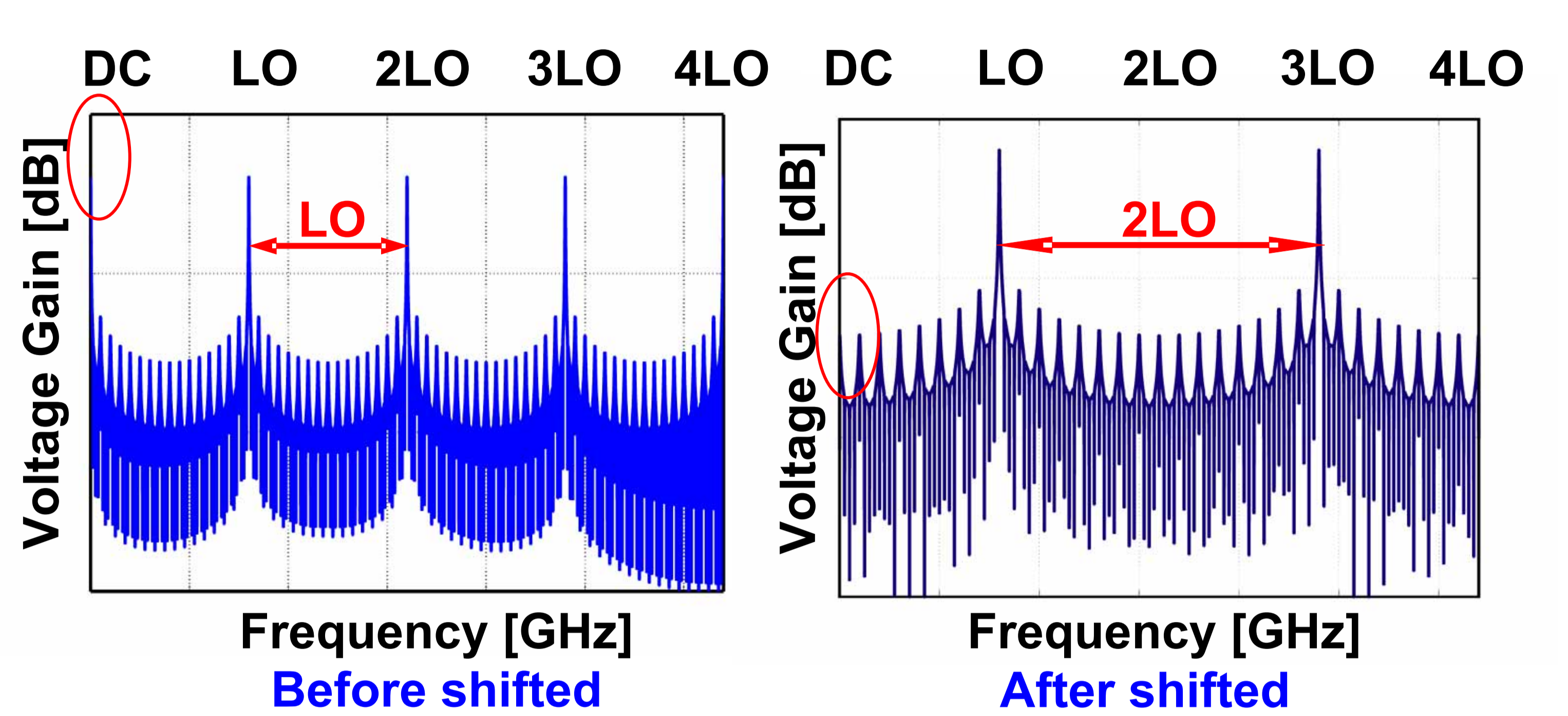
# 1D-5 A CMOS Direct Sampling Mixer Using Switched Capacitor Filter Technique for Software-Defined Radio

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## Background



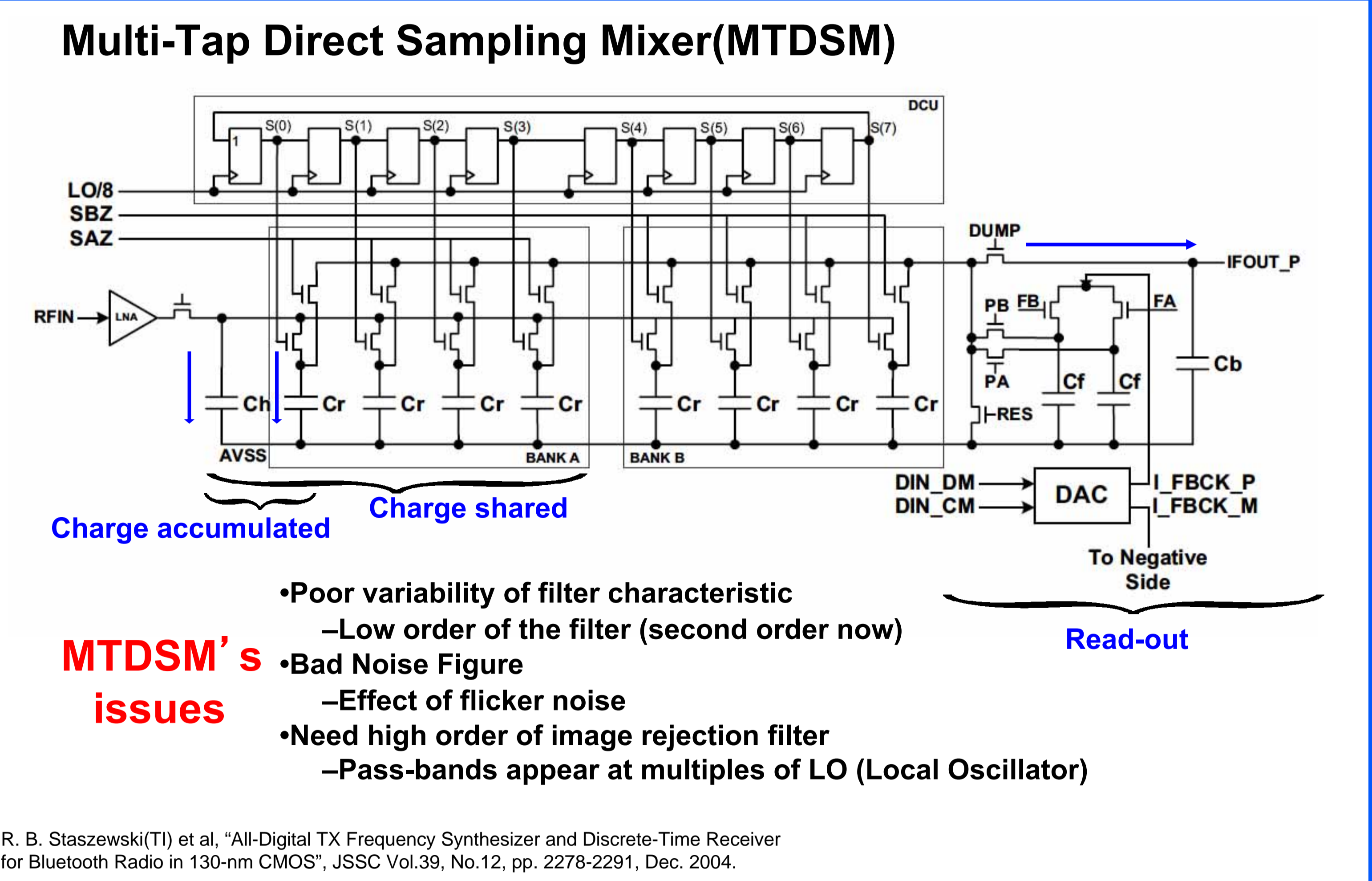
## NF Improvement



**Features due to pass-band shifted**

- Reduce DC component, so NF is improved (about 25dB with the same simulation condition)
- Pass-bands after shifted will be 2LO far away, so the image rejection filter will be relaxed

## Previous Work



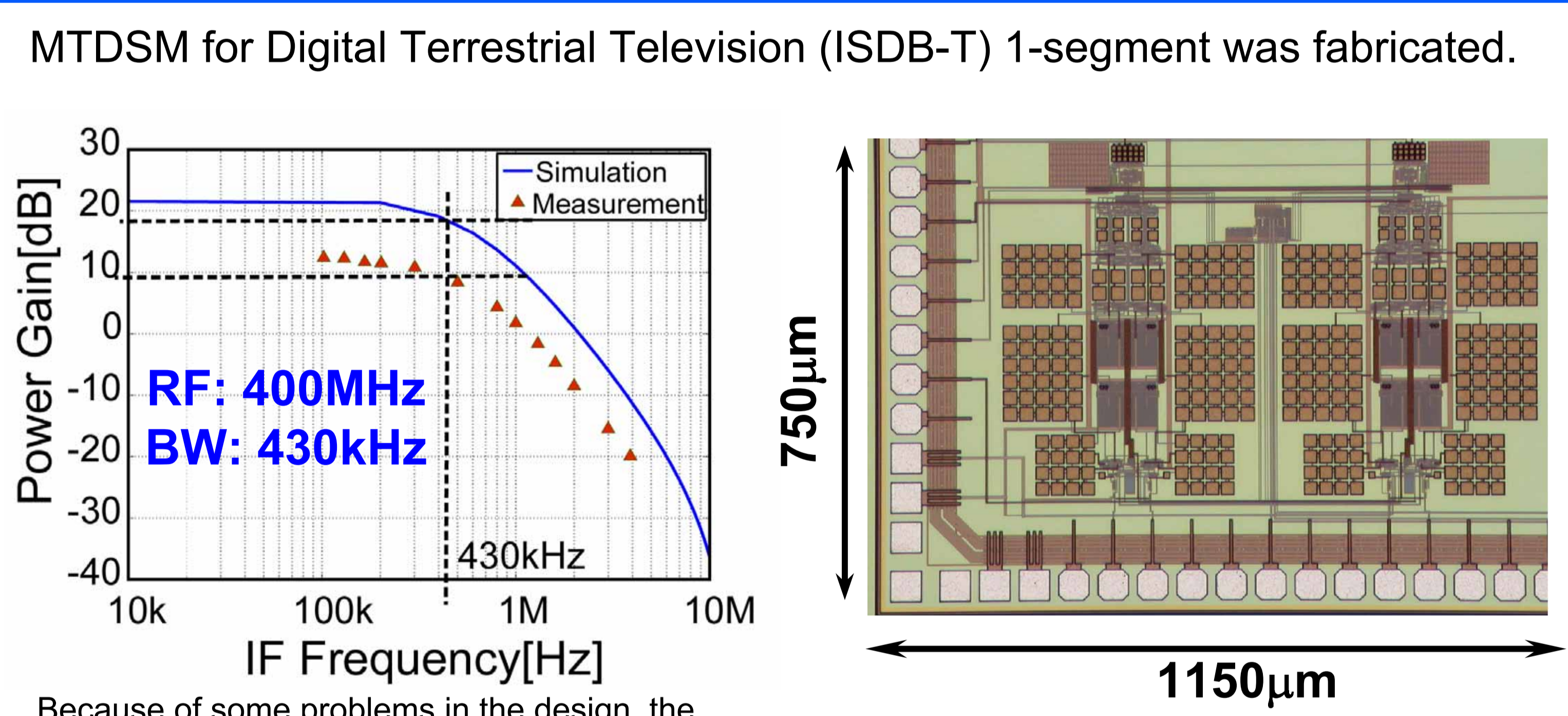
## Purpose of this work

Realize MTDSM using **Switched Capacitor Filter (SCF)** Technique

**Features**

- Filter characteristic is reconfigurable
- Promise higher-order filtering
- NF improvement (pass-band is shifted)
- Relax image rejection filter (pass-band is shifted)

## Micrograph and Measurement Results



Because of some problems in the design, the measurement result did not match the simulation one, but it showed the same tendency.

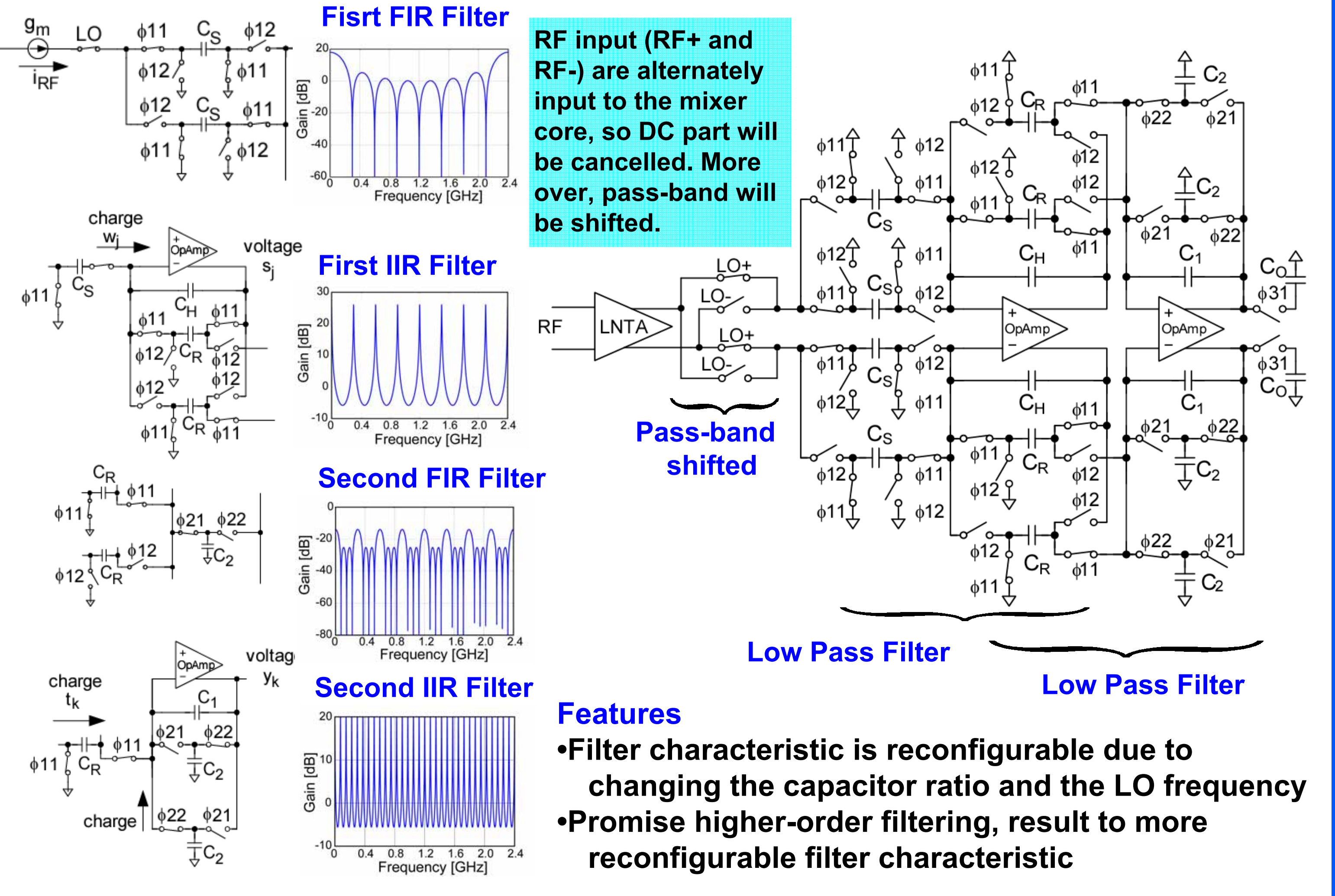
### Measurement results summarize

	Previous work	SCF
Technology		0.18 μm CMOS process
Local Oscillator		800 MHz
Bandwidth		430 kHz
Reconfigurability	Medium	Better
NF	Medium	Better
Gain	Bad	Better
Power	Better	Bad
Area	Medium	Medium

Power Gain @ 400.1 MHz input	12.4 dB
Attenuation @ 3MHz offset	27.3 dB
Supply Voltage VDD	1.8 V
LNTA + DSM core current	18 ~ 20 mA
Power consumption	32.4 ~ 36 mW
Chip area	1150 μm x 750 μm

## Schematic & Operation



## Conclusion

- A direct sampling mixer using switched capacitor filter technique is proposed.
- It improves the reconfigurability while not increasing the power, area so much.

**SCF's Features**

- Easier to reconfigure
- Promise higher-order filtering
- NF improvement (pass-band shifted)
- Relax image rejection filter (pass-band is shifted)

Matsuzawa & Okada Lab.