Reconfigurable transceiver eliminates the need of surface acoustic wave filters

At this week's International Solid-State Circuit Conference (ISSCC2011), imec and Renesas Electronics Corporation present a highly-linear reconfigurable transceiver, eliminating the need of surface acoustic wave (SAW) filters. The unique approach is a major breakthrough towards fully reconfigurable radios by relaxing the requirements of the antenna filters, which suffered today from limited flexibility due to the high filtering specs. The fully reconfigurable transceiver 'Scaldio' is compatible with multiple wireless standards including the fourth generation mobile broadband standard 3GPP-LTE.

The trend in wireless communication where terminals give their users ubiquitous access to a multitude of services drives the development of reconfigurable radios in deep-submicron CMOS. For emerging standards such as 3GPP-LTE, which use a broad range of operating frequencies and bandwidths, multi-mode capabilities of the radio are a must. Scaldio provides a solution to the handset manufacturers, which face the challenge of developing fully reconfigurable radios for a wide range of networks.

One of the major obstacles today in designing fully reconfigurable radios is making the antenna filters reconfigurable due to their stringent requirements. By making the Scaldio receiver highly linear, more out-of-band blocker interference can be allowed in the RF receiver, avoiding the need of SAW filters and consequently enabling a simplified antenna interface. With 3dB noise figure and capable of handling a 0dBm blocker at 20MHz offset, the receiver has the highest blocker resilience for low noise figures. The fully reconfigurable receiver also achieves the highest linearity (+10dBm IIP3, +70dBm IIP2), and frequency range reported up to now and handles blockers well in any mode.

The transmitter combines adaptive out-of-band noise filtering with voltage-sampling up-conversion to achieve RX band noise down to -162dBc/Hz allowing also here SAW-less operation. SAW-less transmitters become more and more important with the evolution towards future standards such as 3GPP-LTE where transmitters will need to operate in multiple FDD (frequency division duplex) bands.

The reconfigurable receiver and transmitter technology is suitable for mobile handsets and all kind of battery-powered wireless connectivity devices, as well as for base-stations for small cells, and can be programmed to meet the requirements for many standards and dedicated needs.

"We are pleased to have contributed to this major milestone of imec's research program on fully reconfigurable radios using state-of-the-art CMOS technology," said Yoshinobu Nakagome, associate general manager of Mixed Signal Core Development Division Technology Development Unit at Renesas Electronics

Corporation. “This accomplishment is an important step towards our integrated RF solution for next generation multimode wireless communication systems. Based on these impressive results, we extended our research partnership with imec for 3 years.”

“We are honored that Renesas Electronics will continue to collaborate within our wireless communication program the coming 3 years. As one of the leading companies in next generation wireless communication, Renesas is an ideal partner to collaborate on the strategy and developing the technologies for future wireless communication systems,” said Liesbet Van der Perre, director green radio programs at imec.

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