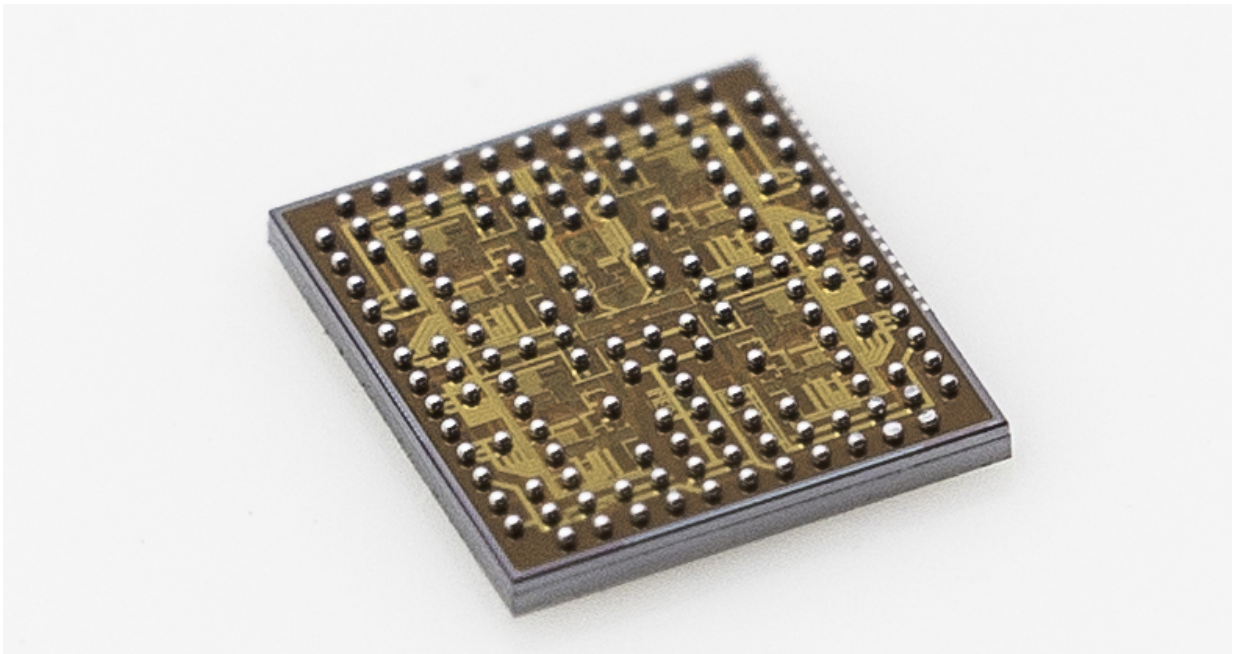


Small, low-cost and low-power chip for multi-gigabit 60GHz communication

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At this week's IEEE International Solid-State Circuits Conference (ISSCC2016), nanoelectronics research center imec and Vrije Universiteit Brussel (VUB) presented a four-antenna path beamforming transceiver for 60GHz multi Gb/s communication in 28nm CMOS technology. The transceiver is a breakthrough in developing a small, low-cost, and low power solution for multi-gigabit communication targeting

WiGig as well as 60GHz wireless backhaul applications.

Due to the tremendous growth of mobile data traffic, display and audio applications, new spectral resources in the mm-wave frequency bands are needed to support user demand for high data rates. One way to realize this is through mm-wave wireless networks based on small outdoor cells featuring beamforming, a signal processing technique using phased antenna arrays for directional transmission or reception. The beamforming steers the radiation in the desired direction while achieving a good link budget that supports high spectral efficiency.

Imec's and VUB's 60GHz transceiver architecture features direct conversion and analog baseband beamforming with four antennas. The architecture is inherently simple and is not affected by image frequency interference. Moreover, a 24GHz phase-locked loop that subharmonically locks a 60GHz quadrature oscillator is inherently immune to the pulling disturbance of the 60GHz power amplifier.

The prototype transceiver chip ($7,9\text{mm}^2$), implemented in 28nm CMOS, integrates a four-antenna array. The chip was validated with a IEEE 802.11ad standard wireless link of 1m. The transmitter consumes 670mW and the receiver 431mW at 0.9V power supply. The transmitter-to-receiver EVM was better than -20dB in all the four WiGig frequency channels (58.32, 60.48, 62.64 and 64.8 GHz), with a transmitter equivalent isotropic radiated power (EIRP) of 24dBm. This allows for QPSK as well as 16QAM modulations according to the IEEE 802.11ad standard, achieving very high data rates up to 4.62 Gbps.

Interested companies are invited to join imec's 60 GHz R&D as a research partner and benefit from collaboration in imec's Industrial Affiliation Program, development-on-demand, academic partnerships, or access to the technology for further development through licensing programs.

Provided by IMEC

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