

New chip creates network 'up to 100 times faster than 5G'

A new type of D-band transceiver chip with a bandwidth of 56GHz using silicon complementary metal oxide semiconductor (CMOS) technology has achieved the world's fastest wireless transmission speed of up to 640Gbps.

The Japan National Institute of Technology and Communications and Tokyo University of Technology have developed a new type of D-band transceiver chip with a bandwidth of 56GHz using silicon-complementary metal oxide semiconductor technology (CMOS) has achieved the world's fastest wireless transmission speed of up to 640Gbps.

This result was announced at the IEEE 2024 VLSI Circuits and Technology Conference in Honolulu, USA.



Wireless systems need to operate at higher frequency bands to process increasing amounts of data at faster speeds. Current 5G systems operate in the 24 to 47GHz frequency range, which can provide speeds of up to 10Gbps.

The new D-band CMOS transceiver chip operates in the frequency range from 114 to 170GHz with a signal bandwidth of 56GHz. The transmitter's integrated circuit chip measures 1.87mm x 3.30mm and that of the receiver measures 1.65mm x 2.60mm.

Test results show that this device achieves high linearity with multi-level modulation schemes such as 16QAM and 32QAM, solving the main obstacles of previous integrated circuit transceiver chips.

In particular, the chip exhibits impressive performance in a multiple-input multiple-output (MIMO) configuration with 4 transmitters and 4 receivers, each antenna able to handle its own data stream, allowing for downloads quickly. When using 16QAM modulation, the total speed achieved is 640Gbps, each channel speed

reaches 160Gbps. This means that 640Gb can be transmitted every second, which can download dozens of HD movies in one second.

These transmission speeds are 10 to 100 times faster than current 5G systems. This is the highest wireless transmission speed ever recorded, achieved using CMOS technology at a low cost, making mass production economically viable.

This chip is expected to become the basis for next-generation wireless systems.

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