PRESS RELEASE
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IBM & Ericsson announce research advance for 5G communications networks

Silicon-based millimeterWave phased array could accelerate launch of 5G-ready networks

IBM (NYSE: IBM) and Ericsson (NASDAQ: ERIC) today announced a research breakthrough that could accelerate the launch of 5G communications networks and support new mobile enterprise and user experiences enabled by very high data rates, including IoT, connected vehicles, and immersive virtual reality.

The companies have created a compact silicon-based millimeterWave (mmWave) phased array integrated circuit operating at 28GHz that has been demonstrated in a phased array antenna module designed for use in future 5G base stations.

2017 has been described as a defining year for 5G. More countries and governments are opening up new frequency portions of the electromagnetic spectrum, including portions known as millimeter wave bands, which are more than 10 times higher than the frequencies currently used for current mobile devices, offering a new source of bandwidth for cellular networks that are being made available for 5G networks.

Scientists at IBM Research and Ericsson reached their breakthrough as a result of a two-year collaboration that set out to develop phased array antenna designs for 5G. IBM's expertise in highly integrated phased array mmWave IC and antenna-in-package solutions, together with Ericsson's expertise in circuit and system design for mobile communications, helped the team reach several new technological milestones.

Thomas Noren, Senior Advisor, Business Unit Network Products, Ericsson, says: "There has been a lot of encouraging progress in 5G standardization last year including the beginning of live field trials. Big efforts in research and development are key to this and our collaboration with IBM Research on phased array antennas can help operators to effectively deploy radio access infrastructure necessary to support a 5G future. New use cases and applications that span human machine interaction, Virtual Reality, smart home devices and connected cars will depend on innovative technologies that can bring the promises of faster data rates, broader bandwidth and longer battery life to reality."

"The development of this 5G millimeterWave phased array is an important breakthrough, not just because of its compact size and low cost, which make it a very commercially attractive

solution for network equipment companies and operators, but its potential to unleash and inspire brand new ideas and innovations we haven't yet imagined, thanks to a fully networked society," said Dr. Dario Gil, Vice President of Science & Solutions, IBM Research.

Making 5G a Reality

The first release of the 3GPP 5G specification is targeted to be ready by 2017/2018, but there has already been much progress in the industry with field tests and demonstrations of new user experiences and capabilities made possible by the higher bandwidth, lower latency, greater density and lower energy requirements of 5G networks.

5G is expected to support data rates exceeding 10Gbps in certain scenarios. New capabilities are designed to allow users to download a full-length HD movie in seconds, provide very high bandwidth and uninterrupted live streaming experiences in highly dense environments such as sports or concert venues, experience 'life-like' response times to enable remote surgery or fully immersive virtual reality experiences, as well as see battery life of 10 years for remote cellular devices that may be part of IoT environments.

About the Phased Array Antenna Module Breakthrough

For future 5G phased array deployments to be commercially viable the size, weight, cost and performance of the component are important factors. The IBM and Ericsson team's result, the world's first reported silicon-based mmWave phased array antenna module operating at 28GHz, is a significant step towards meeting this challenge. The module, which consists of four monolithic integrated circuits and 64 dual-polarized antennas, measures approximately 2.8" by 2.8", or about half the size of a typical smartphone. Achieving this compact form factor is necessary to support the vision of this technology's widespread deployment, especially in indoor spaces and dense downtown areas.

Another performance advance reported by the team is the demonstration of concurrent dual-polarization operation in transmit and receive modes. This capability enables one phased array antenna module to form two beams simultaneously, doubling the number of users to be served at the same time and so improving the overall value and economics of the technology.

A major hurdle for the use of mmWave signals in mobile communications is achieving sufficient range between radios to support target applications. At 28 GHz, each antenna is tiny and individually would support short communication distances, but combining multiple such tiny antennas not only increases the range but also enables steering of signals in specific directions. The IBM and Ericsson team's phased array design supports beam-steering resolution of less than 1.4 degrees for high precision pointing of the beam towards users.

IBM Communications Circuits & Systems Innovation

IBM Research has a long history designing and developing integrated circuits and phased arrays, and were pioneers of the first monolithic mmWave radio in 2006. In 2013, the team presented results of a highly integrated mmWave phased array transceiver for both mobile communications and radar imaging applications that laid the foundation for this latest scientific work. The IBM scientists have also explored how mobile handsets will communicate at new mmWave frequencies, showing a path for how mmWave 5G radios could be implemented in mobile phones.

A paper describing the IBM Research and Ericsson team's work, "A 28GHz 32-Element Phased-Array Transceiver IC with Concurrent Dual Polarized Beams and 1.4 Degree Beam-Steering Resolution for 5G Communications," will be presented on February 7 at the 2017 International Solid State Circuits Conference in San Francisco.

About IBM Research

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Ericsson at Mobile World Congress 2017

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With our customers and partners, we work across industries, physical boundaries and perceived limitations. Join us in Hall 2 or online during MWC 2017 and engage in conversations and demonstrations about our favorite things: 5G; platforms and services for IT and Cloud, Networks and TV & Media; connected solutions for industries; the Internet of Things; and partnering for success.

See you there!

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