



Towards next generation communications: 5G

► Implementation of the FBMC-IOTA system for encoding digital data

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The development of a new system for encoding digital data in broadband wireless communications offers a more efficient solution than the current OFDM technique and will play an important role in the 5G era.

The 5G network – the next generation of mobile and wireless communications – is needed to support the ever-increasing demand for mobile data and the emergence of the Internet of Things (IoT), through which billions of devices will become connected. With the 5G Innovation Centre (5GIC) – the only centre of its kind in the UK – hosted on campus, the University of Surrey is well placed to define the technologies that will underpin the 5G network.

One of the issues being presented by emerging technologies is the encoding of digital data. The orthogonal frequency division multiplexing (OFDM) technique currently in use offers limited spectral efficiency (the rate at which information is transmitted) and is sensitive to Doppler shift (changes in wave frequency). This limits the

number of connections in a cell and creates problems while the device is moving.

Developed by Surrey's Institute for Communications Research (ICS), the new filter bank based multicarrier system employing isotropic orthogonal transform algorithm (FBMC-IOTA) offers a number of benefits over the OFDM technique. It provides improved energy and spectral efficiency, relaxed synchronisation requirements (which is beneficial for sporadic traffic generated by smart phones, for example), and more efficient carrier aggregation, enabling increased bandwidth. In order to create a fully functional prototype, the team succeeded in resolving a number of practical issues, including overcoming intrinsic interference and improving time synchronisation and equalisation (the reversal of distortion).

As a result of the IAA project, the 5GIC has built the world's first FBMC-IOTA prototype in collaboration with the Centre's industrial partner, Aeroflex, a leading worldwide provider of specialised test and measurement equipment and microelectronic solutions.

The FBMC-IOTA prototype was demonstrated at the Mobile World Congress in Barcelona in March 2015.

The 5GIC – bringing together leading academic expertise and key industry partners, the 5GIC hosts the UK's only large-scale testbed for prototyping technological solutions, and is helping to define the global approach to 5G as it moves towards standardisation.

