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## Fractus Antennas—Making the Virtual Reality



**W**hen is an antenna not an antenna? The question may be a riddle but the answer, namely Fractus Antennas' Virtual Antenna™, is a serious phenomenon—a design that challenges the recognized perception of the make-up of antennas used for mobile and IoT applications. However, this technological breakthrough was not developed by an army of boffins in a large laboratory in Silicon Valley but by a focused, dedicated team housed in bright, sunny facilities on a technology park in the hills just outside Barcelona, Spain.

A visit to the facility not only presented the opportunity to see the set-up firsthand but also to meet one of its founders, Dr. Carles Puente. His first research into fractal antennas came as a student and researcher at the Universitat Politècnica de Catalunya (UPC).

In 1999, a fellow student at UPC, Ruben Bonet, was looking to start a company. This not only coincided with Carles' ambition to develop his work commercially but also the evolution of multiband technology. He explained, "We were developing the right technology at the right time, saw the potential for this technology worldwide and so founded the company with help from investors from all over the world."

The company, called Fractus, was active in developing and selling fractal-based antenna products. In 2009, the business was changed into a dual operation with one side selling products, the other selling licenses. However, these licenses were infringed by a number of phone manufacturers, which led to Fractus bringing lawsuits for patent infringement. These were all settled in the company's favor.

Consequently, in July 2015, the company was split into Fractus S.A., dealing with the licensing side, and the formation of a new and independent company called Fractus Antennas SL, in its current form. The whole Fractus Antennas operation is run out of the Barcelona facility with key account managers in Taiwan and India and several worldwide distribution partners, including Richardson RFPD.

While the facility might have a small footprint, the processes and capability for prototyping, testing and validating is extensive, including both chemical and mechanical pro-

tototyping labs. Antenna simulation tools such as CST, IE3D and Microwave Office are used, together with Gerber file importation and analysis. There is a full RF lab with the latest VNAs and two anechoic chambers, including a SATIMO Stargate 32, for active testing of smartphones, alongside a BlueTest reverberation chamber.

Armed with these capabilities, Fractus Antennas develops its Virtual Antenna technology that enables the packaging of full multiband mobile antenna performance in a 5 mm by 5 mm by 5 mm chip antenna component, featuring antenna-less technology based on a new generation of tiny components known as antenna boosters.

Being considerably smaller than the operating wavelength, antenna boosters provide full functional multiband wireless connectivity and fit any device form factor and design.

Carles explained, "Fractus Antennas' architecture offers flexibility to accommodate multiple bands, whether it is 4G, 5G or MIMO. Or the same component can be used for mobile, Bluetooth or GPS. It is more like microwave engineering than antenna engineering and gives electronic and microwave engineers the means to migrate into the antenna field and the wireless space more easily."

"Our aim is to deliver tiny, off-the-shelf, standalone components that provide designers with the flexibility to use them in a way not previously possible. This means that chip antenna components can be incorporated on the motherboard like any other component. So the antenna is no longer an outcast!"

As for the future, Carles believes that smartphones will evolve to antenna-less solutions, yet is realistic enough to know that if this technology is going to be pervasive, Fractus Antennas cannot be the only supplier. So, licensing will be the next option and despite past experience, Carles is unfazed, stating, "You can't just be in your cave inventing technology; you need customer feedback and interaction to develop. We need to deliver the message to the industry that we want to share our antenna-less technology with other supply partners and are ready to do so."

[www.fractusantennas.com](http://www.fractusantennas.com)