

## Fractus Antennas and Cadence

Innovating a New Class of Miniature Chip Antenna Components

Fractus Antennas SL designs, manufactures, and commercializes miniature, off-the-shelf antennas for smartphones, short-range wireless, and connected internet of things (IoT) devices. Founded as an independent antenna product business in 2015, Fractus Antennas was born out of the main Fractus operation and combines a respected R&D team with proven manufacturing capabilities and scale to bring to market a new generation of antenna products to meet the mobile and wireless connectivity needs of original equipment manufacturers (OEMs).

### Key Challenge

Fractus Antennas designs matching networks for a new class of off-the-shelf, surface-mount technology (SMT) chip antenna components called antenna boosters based on the company's proprietary Virtual Antenna antenna-less technology. The challenge faced by Fractus Antennas



Figure 1: Fractus Antennas antenna boosters fit seamlessly within any application, mobile/IoT band, and/or device

#### Application

- ▶ Fractus Antennas' Virtual Antenna™

#### Software

- ▶ Cadence® AWR Design Environment® Software Portfolio, including:
  - Cadence AWR® Microwave Office® software

#### Benefits

- ▶ 10X reduction in design time
- ▶ Highly accurate solution

designers is that the antenna booster component, which fits within any application, mobile/IoT, and/or device, needs a matching network that is more sophisticated than the typical T or Pi network needed for a conventional antenna. Figure 1 is a picture of the new antenna booster.

## Solution

The design team chose Cadence’s AWR Design Environment platform, specifically the AWR Microwave Office circuit design software, as the ideal complement for Virtual Antenna, describing it as “a smart software with great optimization and tolerance analysis features that help to complete the design from concept to production in a fast and effective way.”

AWR Microwave Office software provides a number of optimization and tolerance analysis tools that helped the team design the sophisticated matching networks needed for Virtual Antenna, as shown in Figure 2. The matching response became “live” with the smart tuning elements, providing key insights on the role of each component in the network and providing the exact values for the optimal design. In addition, tolerance analysis enabled the team to assess and tune the final and production-ready designs, making the whole design process productive, reliable, and effective.

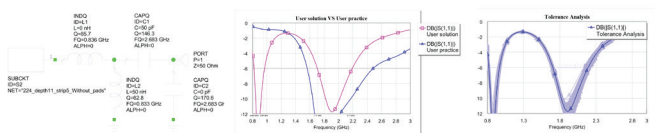


Figure 2: AWR Microwave Office software’s optimization and tolerance analysis tools were useful for designing the matching networks for Virtual Antenna

## Conclusion

The key benefits of using AWR software together with Virtual Antenna technology are twofold: the reduction of design time and the accuracy of the solution. The powerful tools such as the smart tuning and optimization function significantly reduced the time for simulating the most

appropriate matching network for each particular design. Once the proper matching network topology is selected, AWR Design Environment software enabled the Fractus Antennas team to reduce the simulation time by a factor of 10 over a manual design, while at the same time providing highly accurate solutions.

Special thanks to Dr. Carles Puente of Fractus Antennas for his contributions to this success story.



*Cadence’s AWR Microwave Office circuit design software is the ideal complement to the new generation of Virtual Antenna products. The combination of the standard nature of our chip antenna components with the power and intuitiveness of AWR Microwave Office makes going wireless fast, easy, and very cost effective.*

Dr. Carles Puente, VP Innovation  
Fractus Antennas



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