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WHITEPAPER

Make the most of Wi-Fi with Virtual Antenna®

Manufacturers of WiFi-enabled devices, with the help of Ignion knowhow, can enjoy custom antenna performance with an off-the-shelf product.

Makers of Wi-Fi-enabled devices and access points (APs) have good reason to be optimistic

Helped by new standards to improve performance, and availability of more unlicensed spectrum, the number of Wi-Fi-enabled devices worldwide is set to rocket.

ABI Research calculates the global base will reach more than 15.5 billion by 2025, up from around 10.4 billion in 2020. Fast-growing target markets, such as **automotive, smart home, home entertainment, gaming, and wearables**—as well as increased enterprise adoption—are fuelling Wi-Fi growth.

Nobody likes an unreliable Wi-Fi connection, however. If device makers are to make the most of the Wi-Fi opportunity, their products will need to provide stable and predictable performance.

Achieving higher data throughput, nippier latency times, and lower power consumption—all of which are baked into Wi-Fi 6 and Wi-Fi 6E standards—is a must. Moreover, all these performance boxes must be ticked across different frequency bands.

An optimal approach to antenna design is therefore key, which is where Ignion comes in.

Wi-Fi disruption with Virtual Antenna® technology

Ignion's innovative, off-the-shelf Virtual Antenna® system slashes time-to-market for Wi-Fi-enabled devices, while still achieving equivalent performance levels of customized antenna. Neither is there any need to rely on antenna experts to wrestle with design intricacies associated with multiband products.

Through the company's revolutionary technology, and using a simple matching circuit, electronics engineers can **easily 'tune' devices for different frequency bands** and still ensure necessary performance levels. Design lifecycles are then shortened, costs are lowered and—thankfully for business decision-makers—outcomes are predictable. There is no need for experimental and artisan antenna designs, which always carry the risk of underperforming, delaying time-to-market and breaking R&D budgets.

Dan Shey, Managing Director and Vice President at ABI Research, is impressed with Ignion's cutting-edge solution. "**The matching network can be created within hours**", he says. "And because Virtual Antenna® technology is off-the-shelf and modular, device manufacturing replicability and speed is assured. Virtual Antenna® system should lower total cost of development."

Inventory management and supply-chain logistics become much easier to handle too. Because the Virtual Antenna® Wi-Fi portfolio, which comprises only three products—but which **cover all standards and frequency bands** associated with the wireless protocol—there is no need to try and source different chip antennas for different regions where spectrum availability might differ.

Non-recurring engineering costs can be avoided, since only one design-cycle is needed for the same Wi-Fi-enabled device to operate successfully in different regions.

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Dan Shey
Managing Director and Vice President
ABI Research

In a recent whitepaper by ABI Research[1], which highlights the advantages of using Ignion's approach compared with other methods of antenna design, the market research firm concludes that "one of the principal benefits of the Virtual Antenna® is to help streamline product stocks and integration complexity".

[1] Rethinking IoT Device Development With Virtual Antenna Technology

No performance trade-offs

Carles Puente, Ignion Co-Founder and Vice President of Innovation, makes clear it is a false notion to think that Virtual Antenna® technology, because it is off-the-shelf, means Wi-Fi performance trade-offs.

"Some people might feel there is dilemma," he says. "If you want to get top performance, so this thinking goes, you need custom antenna. If you want to get something fast and cheap, then an off-the shelf chip antenna is the way to go. **Our technology enables the best of both worlds**. You get a custom performance by simply adjusting the matching network, not the antenna part. There is no trade-off in performance with Virtual Antenna® systems."

PCB (printed circuit board) trace and stamp metal are among some of the other options for antenna design. The former might be attractive, cost-wise, for single-band applications, but knowing how to adjust the length and geometry of the trace can be problematic for multiband deployments. One big disadvantage of PCB trace, says ABI Research, is possible inconsistency in production processes, which, in turn, leads to quality issues.

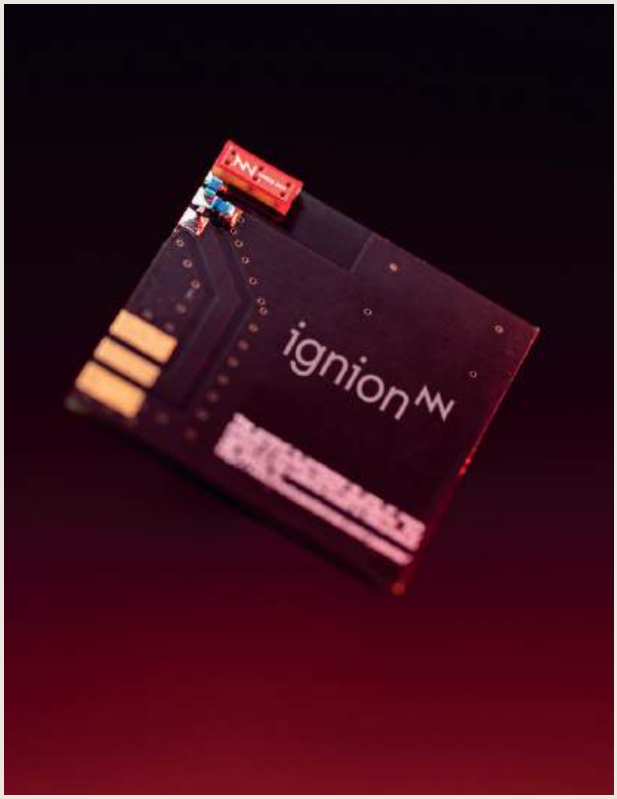
"If you change the frequency band or PCB size, when using other methods, you're back to the drawing board and have to do a redesign. With Virtual Antenna® **there is no need to start from scratch.** Device makers can reuse existing designs."

Dan Klaeren
General Manager for the Americas region
Ignion

The easy-to-use 'matching-network' capability, which is part of the Virtual Antenna® system, does not run into those sorts of problems.

The metal stamp approach, according to ABI Research, can offer good multiband performance, but only with "proper custom design". This can involve extra investment in bespoke manufacturing molds and tooling for each design. Vibration might also loosen the antenna.

"If you change the frequency band or PCB size, when using other methods, you're back to the drawing board and have to do a redesign," says Dan Klaeren, Ignion's General Manager for the Americas region. "**With Virtual Antenna® technology there is no need to start from scratch**. Device makers can reuse existing designs."



Ignion Wi-Fi portfolio now includes NANO mXTEND™, the world's smallest Virtual Antenna® component

Ignion has three off-the-shelf Wi-Fi Virtual Antenna™ products, each of which is suitable for small form factors. They cover all standards and frequency bands associated with the wireless protocol.

"The Wi-Fi market expects small, sleek, sexy devices, whether you are consumer or enterprise, and you want to get those out to market fast," says Ignion's Dan Klaeren. "That means **reducing design cycles and reducing risk**, which is all possible with our unique wireless Fast Track tool."

Fast Track provides sample matching circuit design for a Wi-Fi device within 24 hours. Each Wi-Fi-enabled package from Ignion is Fast Track compatible.

"The Wi-Fi market expects devices that are **small, sleek, sexy**, whether you are a consumer or an enterprise, and you want to get those out to market fast".

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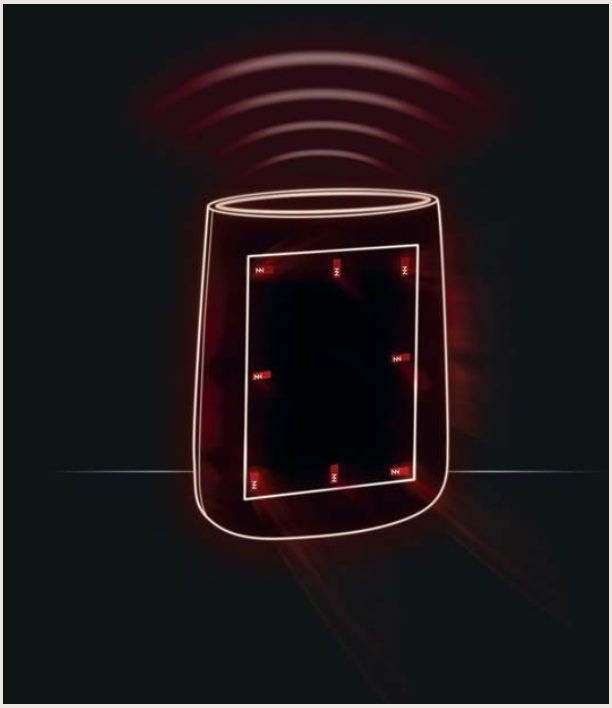
NANO mXTEND™, measuring a super-tiny 3.0 x 2.0 x 0.8 mm, is the world's smallest off-the-shelf Virtual Antenna® chip. Launched at Wi-Fi World Congress in May, the NANO mXTEND™ dual mounting system enables either corner or edge placement on the PCB. The first use-case is centred around the 2.4 GHz frequency band, which also supports Bluetooth.

DUO mXTEND™ supports Wi-Fi 6 and covers the 2.4 GHz and 5 GHz frequency bands. It measures 7.0 x 3.0 x 2.0 mm and is an excellent fit for access points and edge devices, such as gaming headsets, which require both 2.4 GHz and 5 GHz connectivity.

ONE mXTEND™ is a miniature and ultra-slim chip antenna. Measuring only 7.0 x 3.0 x 1.0 mm, it can fit into almost any hardware platform.

Covering the 2.4 GHz, 5 GHz and 6 GHz frequency bands, ONE mXTEND™ supports Wi-Fi 5, WiFi 6, and Wi-Fi 6E. Even if device makers are not yet ready to use the full gamut of Wi-Fi standards and frequency bands, by adopting ONE mXTEND™ from the get go **there is no need for lengthy and expensive redesigns** when the time is right for expansion. ONE mXTEND™ is a future-proof way to design Wi-Fi-enabled products.

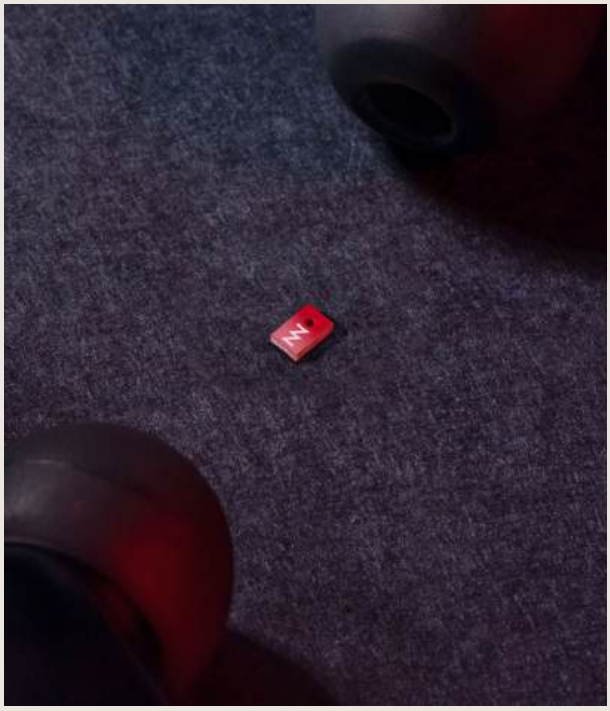


Ready for 8x8 MIMO

The arrival of Wi-Fi 6 extends support for Multiple-Input, Multiple-Output (MIMO) from 4x4 antenna configurations, which are possible with Wi-Fi 5, to 8x8 MIMO. The new standard also introduces uplink multiuser capability, MU-MIMO, which allows multiple clients to transmit to the AP at the same time.

The need to accommodate multiple antennas in tight spaces, to boost Wi-Fi capacity, plays well with Ignion's tiny Virtual Antenna® chip technology.

"In a MIMO arrangement, if you have antennas too close together, it can result in sub-optimal coupling," explains Puente. "With our innovative solution **you can place our chip antennas on or around the PCB frame, in the AP or device**, knowing that they occupy the minimum space and are as separated as much as possible, while still delivering the multiband performance that is needed."



Chip shortages do not affect Ignion

Due to the pandemic, ceramic chips and semiconductors are in short supply. This does not affect manufacture of Ignion's chip antennas. These are based on epoxy glass materials, a substrate typically found in PCBs.

A widely available material, epoxy glass is manufactured in multiple facilities around the globe. Customers of Ignion's Virtual Antenna® chips **do not need to fret about long lead-in times**.

Neither do they need to worry about unpredictable design lifecycles and substandard performance by using an off-the-shelf product.

The Virtual Antenna® system provides peace of mind for makers of Wi-Fi-enabled devices, makes their lives much easier, and allows them to make the most of a booming market.

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