FRACTAL METAMATERIALS ENABLE ANTENNA REVOLUTION

Waltham MA—5 October 2009--Fractal Antenna Systems, Inc. today announced development of a new metamaterial technology that uses fractals to make layered, partless antennas and related electronics. Fractals are complex geometric shapes built up from a repetition of a simple one, while metamaterials are composites with unusual properties not found in nature. These new antennas, called "metacloak™' antennas, have unique performance abilities in bandwidth, gain, directivity, and versatility of form factor.

"Previously antennas had attributes in many form factor and performance regimes, but these new antennas are unprecedented", notes inventor Nathan Cohen, CEO of the firm. The new antennas have layers that are partless, with no electrical connections, are lightweight, have no ferrite or exotic materials, and are easy to make and implement. They can be far smaller and far thinner. Built up as layers of separated printed circuits to form a covering or 'cloak', the technology also applies to other EM spectral regimes, in addition to RF.

The cloaking layers use close-spaced fractal resonators, tiny partless circuits, to accomplish the effect, and Cohen notes that the scientific community has commonly called close-spaced resonators metamaterials. The firm owns the patent on fractalized resonators systems, as used in these metacloak™ antennas, and has many patents and pending patents on this and other metamaterial technologies. "You just can't optimize nor render practical this new class of antennas without fractals and our technology", added Cohen," as the smaller size and pleasing bandwidth attributes of fractal resonators enable the new metamaterial advantages". Cohen also points out that: "The technology has also led to fractal-based arrays that are far smaller than expected from their gain, while maintaining very broadband ability."

The new antenna technology builds on the foundations of the metamaterial physics of plasmonics, first applied by Nobel Prize Winner Gugliemo Marconi in a 1919 patent, and also seen in an obscure type of antenna called a CCD, invented in

1961. “These historical technologies hinted at something beyond their own hoary possibilities, but sometimes it takes a new twist to open up a field. We use fractals in plasmonics to get the currents to be slowly varying across the entire aperture within a wideband, dropping off at the physical boundary conditions. FRACTAL’s team had the know-how to be there first and has been working on developing the technology for sometime”, noted Cohen.

As an example, a conventional monopole (Marconi) antenna was snugly covered by a slip-on cloak of fractal metamaterials. Instead of the cloak blocking out the antenna’s emissions, it dramatically enhanced and controlled the bandwidth and gain. Both the performance enhancements and simple method of achieving them constitute a breakthrough in the antenna field. “To take a simple and well understood antenna and produce something previously unrealized, with a slip-on tube, was one sweet moment. It redefines a field. The effect is transformational” said Cohen. The cloak approach applies to most types of conventional antennas, such as patches and slots, as other examples.

The firm first publicly showed the new technology in a live demo at a colloquium at Harvard University in April. Many dozens of scientists; engineers; government researchers; patent attorneys; students; and antenna experts have witnessed the demo.

“Metacloak™ antennas and their array applications are far and away the most important applied applications of metamaterials to date, taking that field out of the science fiction and research stage and well into applied reality”, asserted Cohen.

Cohen believes that the new metacloak™ antennas leapfrog developments being pursued by other researchers, by 5 to 15 years. “It’s common for us to be far ahead of the pack, and we always have a lineup of new technology to roll out”, he added. For example, in March, 2009, the firm disclosed the world’s first wideband

metamaterial invisibility cloak, which also uses fractal metamaterials in a different application. Shortly before, other researchers published predictions in prestigious journals that wideband metamaterial invisibility cloaks could never be made.

The new antenna technology is expected to allow antennas to go in many places they haven't been used before, especially in conformal or hidden platforms. "It can be used to integrate antenna onto surfaces used for other things, thereby making the separate antenna platform notion a relic in many cases", notes Cohen. The firm sees the new technology as a logical extension of its core technologies and a new and versatile addition in solving challenging problems in electromagnetics. It is reserving specific applications of the technology for government needs, and a rollout in the first commercial products in 2010.

A metacloak™ monopole antenna prototype is now shown as an heuristic example on the www.metacloak.net website, with other examples and a white paper to follow. An educational video on the new fractal metamaterial technology, including the world's first wideband invisibility cloak, is being produced by the firm for a late-Fall release.

ABOUT FRACTAL ANTENNA SYSTEMS, INC.

Fractal Antenna Systems, Inc. (www.fractenna.com) supplies products for the world's most demanding wireless, and electromagnetic applications. Backed by eighteen U.S. patents, international patents, plus numerous patents pending, Fractal Antenna Systems is the recognized pioneer in fractal technology, with extensive research and field experience over 15 years in business. The company is a privately held and headquartered in Waltham, Massachusetts, USA. The firm's fractal metamaterial and cloaking work are found at: www.metacloak.net. Metacloak™ is a trademark of Fractal Antenna Systems,Inc.