ANATECH ELECTRONICS INC

AT THE CENTER FREQUENCY

An e-Newsletter from Anatech Electronics

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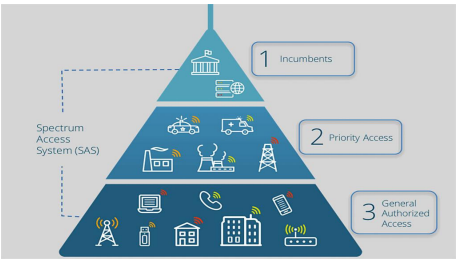
What's News...

FCC OKs CBRS Deployments

The FCC has approved the Spectrum Access Systems (SASs) operated by Google, Federated Wireless, CommScope, Amdocs, and Sony for managing Citizens Broadband Radio Service (CBRS) networks. CBRS is the Next Big Band for wireless carriers, Wireless Internet Service Providers (WISPs), private LTE networks, and cable operators looking to deploy their own cellular services. In addition, there are many other possible use cases for the band, as it offers a tiered structure consisting of licensed and unlicensed operators. As the SAS is the essential element for managing CBRS devices to keep them from interfering with Navy radar systems, the FCC approval is a major step forward.



Microwave Energy for Plastic Recycling

A European research project is testing a way to make recycling PET plastic (used to make packaging, soda bottles, and clothing) more effective by combining microwave technology with a chemical reaction. The degradation of PET is called depolymerization and the first step in the process uses microwave energy to convert PET waste into hydrolyzed plastic. The plastic is then separated from other materials, which allows them to be renewed for further use. This is done using a complicated purification process. The project is funded by the EU's Horizon 2020 program.

A Word from Sam Benzacar

Coming: Plasma Antennas

By Sam Benzacar

If you think there cannot possibly be any radically new antennas in the works, you'll be surprised to learn, as I did, that there are, and one of the most "far out" is the plasma antenna. The name alone connotes something more likely to be found on the Starship Enterprise, but plasma antennas are real—and impressive.

Gases are typically insulators and not conductive. However, when they're exposed to heat or electromagnetic energy a plasma is created through ionization in which atoms are converted to ions and electrons. In contrast to its former state, a plasma is conductive which provides its appeal for use with systems operating in the electromagnetic spectrum, including antennas. A plasma antenna can perform the same functions as conventional array antennas with fewer components and at lower cost, including steering and beamforming, have demonstrated operation at millimeter-wave frequencies, and can handle a considerable amount of RF power.

What sets a plasma antenna even further apart from any other type is that when it's turned off it becomes nearly invisible, making it extremely difficult to detect by radar, as its radar cross section essentially consists of just the material in which the plasma is contained, such as glass. That is, when the energy source is removed the plasma becomes a neutral non-conductive gas, a process that takes just milliseconds. Plasma antennas can also have low sidelobes that further decrease their likelihood of being jammed. The technology has other benefits as well.

There are two basic types of plasma antennas, semiconductor and gaseous, the former the first to be developed (but still valid) and the latter recent fabricated using silicon fabrication processes to create what's called a plasma silicon antenna (PsiAN). This device consists of huge numbers of diodes that when activated individually generate a cloud of electrons, forming a plasma.

Each cloud reflects RF energy like a mirror and if the diodes are selectively activated the shape of this "reflector" can be changed rapidly to focus and steer a beam. The antennas are very small, at 28 GHz measuring about 10 mm in diameter and 4 mm at 60 GHz and produce very high forward gain. If lower gain can be accommodated the antenna can be radiated directly by the chip.

A Microwave Weed Killer

University of Melbourne researcher Dr. Graham Brodie has invented a device that uses microwave energy to control weeds, reducing the need for herbicides. By using microwave energy to heat the water particles within a weed, the vibrations cause the plant cell walls to explode, killing the plant. But the challenge is to translate the concept into a product that can work in the field over large areas without using too much energy.

To meet that challenge, Brodie has designed an antenna that can effectively deliver microwave energy specifically into the weeds, as well as into the ground itself to pre-treat soil before crops are sown. The technology reportedly not only kills weeds but also eliminates dormant seeds, according to Brodie, who has spent the last 5 years improving his invention, testing it on more than 25 species of weed including ryegrass, barnyard grass, bellyache bush, hemlock, wild radish, wild oats, and fleabane.

The antenna confines the microwave energy closely to the surface of the ground, and as the system is modular it can attach to tractors. The product has been commercialized with investment from Grains Research & Development Corporation, resulting in a company called GroWave.

Several companies are developing this technology and have commercialized their designs, and as DoD is obviously extremely interested in plasma antennas it's likely we'll be hearing about them a lot more in the future.

A PSiAN from Plasma Antennas, Ltd.

What's News (cont.)...

Air Force Develops THOR to Kill Drones

The Air Force Research Laboratory recently demonstrated an electromagnetic weapon called the Tactical High-power Operational Responder (THOR) designed to disable drones. It was shown at the recent Air Force Association Air, Space, and Cyber Conference, and has been built and tested on military test ranges near Kirtland AFB, where it has successfully engaged multiple targets. Further testing against a larger set of drone types in swarming configurations is planned.

THOR could be useful in attacks like those on Saudi oil fields in which multiple drones of different sizes made it possible for the larger ones to shadow the smaller ones, protecting them from radar detection. THOR stores in a 20-foot transport container that can be transported in a C-130 and can be set up in 3 hours, according to AFRL. THOR cost about $15 million to develop.

Anatech Microwave a sister company to Anatech Electronics is making its debut by offering Passive wideband application products such as Power Dividers, Directional Couplers, Circulators, Isolators, and many other passive RF products.

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