Wideband high-gain resonant cavity antenna

THE EXISTING PROBLEM
Commercial, domestic and defence wireless systems need robust, high-speed wideband antennas and their bandwidth requirements continue to increase rapidly. To achieve high-speed fixed wireless links, existing wideband, high-gain antennas are large, complicated, expensive, can have awkward configurations and are aesthetically unappealing. To achieve around 20dBi antenna gain over a large bandwidth (>20%), existing antennas require footprint areas of at least 10 square wavelengths.

OUR SOLUTION
Prototype of RCA with a total footprint of 1.5 square wavelengths; 16.4 dBi directivity; 53% bandwidth

This invention is a resonant cavity antenna (RCA) that consists of an air (or dielectric) cavity between a single layer dielectric superstrate and a ground plane, with one or more simple embedded feed antennas.

The key difference between this invention and other RCAs is that the material properties (e.g. dielectric constant) of the superstrate is not constant. The dielectric constant of the superstrate shown in the figure above decreases with radius in steps. This change in dielectric constant can be step-wise as in the figure or continuous, depending on the method of design and fabrication.

Antennas having excellent performance have been designed with areas as small as 1.6 square wavelengths and they can be made even smaller if required.

ADVANTAGES

- Greater merit
- Increased gain, bandwidth
- Large bandwidths 50-60%
- Single antenna Supports multiple wireless standards, bands & sub-bands
- High gain 15-20 dBi
- Small footprint 0.8-2 square wavelengths: better wind resistance, low weight
- Planar shape Aesthetically appealing
- Low cost Simple fabrication
- Versatile & scalable dual linear and circular polarisations also possible

APPLICATIONS

- High speed point-to-point microwave wireless links (backhaul, commercial & residential, building to building)
- Fixed wireless access subscriber links, including customer last-mile connections
- Millimetre-wave ultra-fast (e.g. Wi-Gig) wireless links (indoor and short-range outdoor)
- Wideband defence systems
- Interleaved Dual-band (e.g. X- and Ku-band) Radar Arrays for defence and/or weather stations

INVENTORS
Karu Esselle, Raheel Hashmi
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INTELLECTUAL PROPERTY POSITION
WO2015/192167 “Wideband high-gain resonant cavity antenna”

PUBLICATIONS
A Class of Extremely Wideband Resonant Cavity Antennas with Large Directivity-Bandwidth Products
Achieving High Directivity-Bandwidth through Flat GRIN Superstrates in Fabry-Perot Cavity Antennas

WOULD YOU LIKE TO KNOW MORE?
Contact Anna Grocholsky +61(0) 437 463 317 or anna.grocholsky@mq.edu.au