RECONFIGURABLE COMPACT ANTENNA STRUCTURE FOR ULTRA-WIDE FREQUENCY AGILITY WITH STABLE UNIDIRECTIONAL RADIATION PROPERTIES

Technological advantages

Extreme compactness : Reduced dimensions, ideal for highly space-constrained environments.
Wide frequency agility : Features a tunable fractional bandwidth
Stable unidirectional radiation: Uniform radiation pattern and stable beamwidth across the entire operating frequency range.
Polarization flexibility: Capable of radiating with circular polarization or linear polarization.
Dynamically reconfigurable architecture: Utilizes simple electronic switches and variable reactive loads.

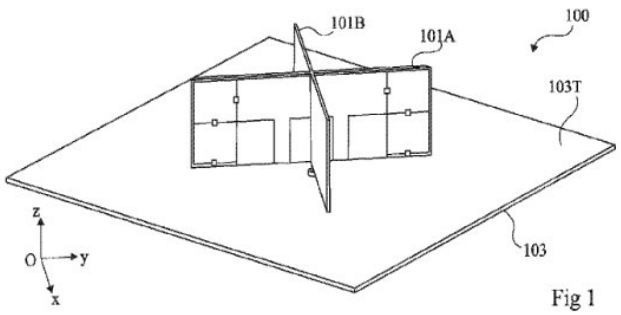


Fig 1

Antenna schematic

100. Radio-frequency antenna
101A.101B . Antenna elements with conductive regions to switch the operating mode.

Invention synthesis

This invention relates to a compact and reconfigurable radiofrequency communication antenna designed to overcome the size and bandwidth limitations of conventional antennas. It operates using one or two radiating elements consisting of multiple conductive regions interconnected by electronic switches and variable reactive loads. By dynamically altering the open / closed state of these switches via a control signal, the antenna changes its physical topology to cycle through four distinct operating modes: a half-loop antenna structure, a bent dipole structure, a long straight dipole structure and a short straight dipole structure. This offers strict geometric compactness with a wide fractional bandwidth while guaranteeing a stable, unidirectional radiation pattern.
This eliminates the need to deploy multiple separate antennas to cover different frequency bands.

Potential applications

Space sector and small satellites: Integration into 1U CubeSat nano-satellites.
Satellite constellations: compact launching of multiple satellites on a single launch vehicle.
Exploration missions: Spacecraft and rovers, reliable and unpowered (or zero-energy) mechanisms.
Multi-frequency communication: Operates across a wide frequency range, from 3 MHz to 10 GHz.

Commercial benefits

Cost reduction: A single multiband antenna replaces multiple dedicated antennas, lowering the overall hardware cost of electronic systems.

Space savings: Maximizes the internal volume available for other valuable components.

Standardization and versatility: Antenna can be software-configured for various international frequency standards or market segments.

Manufacturing simplicity and reliability: Built using standard printed circuit boards (PCBs) and mature components.

Patented invention - under license.

For more information :

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