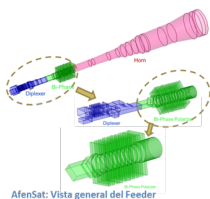


AFeNSat. Revolutionary technology for the next generation of sat

New configuration of dual-frequency band antenna feed for single circular polarizations, with significant benefits to existing solutions in the market.



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Technological Offers type

Technological solutions

Research and innovation areas

- Digital Technologies, Artificial Intelligence, Cybersecurity, 5G, Robotics
- Space and Earth Observation



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Where?

Applied Electromagnetism Group Information and Telecommunications Processing R&I Centre

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Brief description of the technology solution and the added value it provides

The current onboard multi-spot satellite antennas and their corresponding ground feeds require dual-frequency band and circular polarization. There are currently two technological solutions that have several power restrictions and/or a very high cost due to their mechanical complexity. The new feed architecture of the invention is based on a Diplexer + Biphase-Polarizer. It provides excellent electrical specifications (Isolation and Axial Ratio) with a very simple low-cost mechanical structure .

Description of the technological base

AFeNSat (Antenna Feeding Network for New Generation Satellite Communications) is based on the combination of a Diplexer and a new Biphase-Polarizer. This new configuration provides enhanced electrical characteristics: bandwidth, matching, Axial Ratio (AR) and isolation that solve the restrictions of the actual feeds based on the combination of OrthoMode Transducer (OMT) and corrugated Monophase Polarizer. Also, this solution simplifies the mechanical fabrication with the subsequent cost saving compared with the six-port junction-based alternative.

The new feed, unlike current, no need of alignment of its components, thereby providing great versatility to the antenna structure, which can be used to reduce their size and complexity.

“AFeNSat solves the alignment issues of its constitutive components and has significant advantages in terms of electrical performance, as well as low-cost and simple mechanical assembly”

Market demands

- **Space**
 - The multi-spot satellite antennas need of a large number of feeds, designated as USER-FEED, usually working in the Ku/Ka-band (20-30 GHz) with circular polarization.
 - At present, the driving solutions are: 1) Dual-Band Corrugated Polarizer + OMT and 2) six-port junctions combined with single band polarizers. The first alternative presents important electrical constraints and the second one is rather complicate and expensive due to its cumbersome mechanical structure.
 - The new proposed feed achieves the required stringent electrical specifications with a simple low-cost light structure and easily integrable in a multi-spot antenna.
- **Ground stations (VSAT)**
 - For ground stations (SATCOMs) operating in circular polarization, the isolation between bands is a critical parameter. The new feed easily achieves isolation levels above 100 dB, without deteriorate the return loss or the AR.
 - In these applications, compact feeds add a significant advantage to the antenna.

Competitive advantages

- The proposed new feed provides an excellent solution for new multi-spot Ku/Ka antennas onboard satellites and at ground stations (SATCOMs).
- It provides excellent electrical specifications: return loss better than 27 dB and AR better than 0.25 dB with a simple and compact structure. This allows a great reduction in mass and volume, which is critical for onboard antennas.

Feeder 1

Feeder 2

Two examples of electrical specifications of the Feeder

- The advantages over current solutions are the electrical performance, the mechanical simplicity and the versatility for interconnection.
- It significantly reduces the cost of the current solutions.

Development stage

- Concept
- **Research**
- Lab prototype
- Industrial prototype
- Production

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