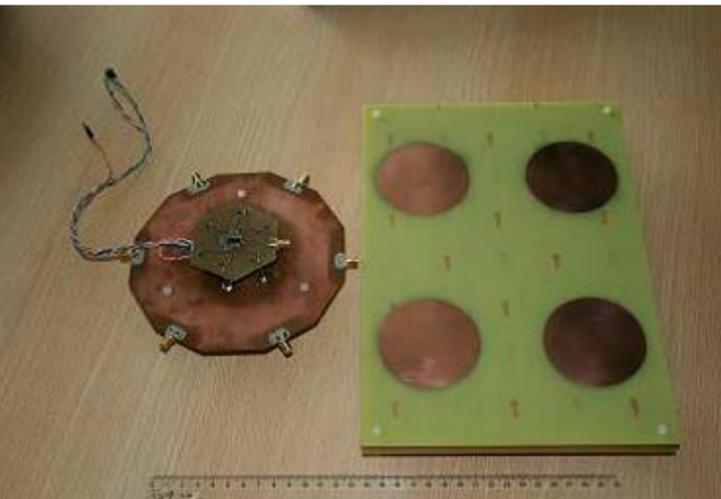


RADIOVOIP Maritime Antenna Design

Radiovoip-Maritime Antenna Design Is A Project That As The Main Objective To Allow The Use Of Terrestrial Mobile Communications (3G And 4G) Within Sea Shore. Within That Respect The Main Objective Of The Project Was The Design Of A Sectorial Antenna That Enables These Type Of Communications For 3G/4G Communications.



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Funding Agencies	
FCT-PTDC	40,400€
Start Date	01-2011
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Indicators	
Journal Papers	1
Conference Papers	4
Concluded MSc Theses	2
Two Main Publications	
L. Brás, P. Pinho, N. B. C. Carvalho, Evaluation Of A Sectorised Antenna In An Indoor Localization System , <i>Int. Microwaves Antennas & Propagation</i> , Vol. 7, No. 8, Pp. 679 - 685, June, 2013.	

PROJECT WEBPAGE URL

<https://www.wavecom.pt/projetos-de-investigacao-e-desenvolvimento-tecnologico/>

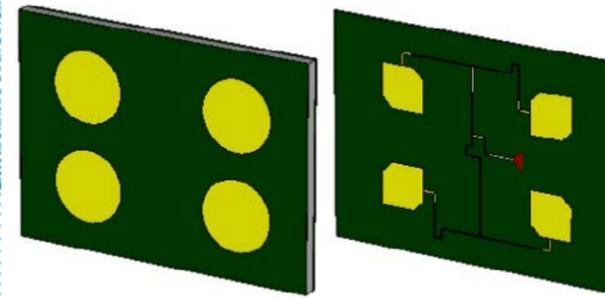


Fig. 1 Antenna prototype.

GENERAL MOTIVATION AND OBJECTIVES

Development of an antenna for maritime mobile communications

CHALLENGE

Sea navigation always has its dangers. A message sent to a ship that a storm is approaching or a message sent to earth to ask for help because of some problem, can save lives. The aim of this project is to produce a sectorial antenna that allows to obtain the maximum possible gain in all directions and thus to ensure better quality in communications. To make this possible, a smart antenna where the signal power is concentrated in one specific direction was designed, and this direction can be switched depending on the one that is determined to be the most advantageous.

WORK DESCRIPTION AND ACHIEVEMENTS

This maritime antenna project consist in the development of an antenna array with beam switching system in accordance with the company specifications.

The switching system consists of 3 modules, an antenna and two rf switches, one for control and another one for the mobile modem connection.

The antenna consists of an antenna array that is tuned the 1800/1900 MHz band, fulfilling the requirements set in terms of gain and horizontal/vertical beam width.

The switching circuit comprises an rf 6-1 switch that allows switching between the various household elements and the measurement and control unit.

The control unit consists in a microcontroller and a GSM/UMTS modem that is used to perform the switch control based on current RSSI values and previous read's in each antenna element. The best element is then connected to the GSM/UMTS module allowing data link to the operator.



Fig. 2 Developed System.

One of the key issues is the relationship between coverage beam and antenna gain, the boat in the sea still has some fluctuations, so the width of the lobe should be controlled vertically. Existing measures reveals that the minimum width should be 25°. In order to meet this requirement an antenna unit with sequential feeding and parasitic patches were designed. The use of parasitic antenna helps to increase the bandwidth.

There are six antennas distributed in the azimuthal plane, each connected to a different coupler. This coupler is used to obtain the RSSI of the measured signal, this output is then connected to a microcontroller that selects the best (high level RSSI) antenna and connects switch 2 to it, so that the mobile communication modem received the best and improved signal.

A fully test-set had been set for a pilot installation in a tour boat company running in the douro river, the situation to resolve was to cover the douro river propagation landscape.

The test plan was to measure the signal strength received along the douro river, on its way from Vila Nova de Gaia to Barca de A lva, and compare the same with a conventional antenna (omni 5dbi) to measure the gain obtained with the system. They were also carried out debit and latency tests along the way to also assess the quality of service guaranteed by the system. The system behaves well in most of the trajectory, allowing a connection to the mobile operator, contrary to the simple antenna approach.

The proposed solution is now a commercial product that is on the market as a product for the supporting company.