Self-biased Receiver System

Tech ID: 20492 / UC Case 2005-682-0

SUMMARY

UCLA researchers in the Department of Electrical Engineering have developed a self-biased receiver system with a dual branch architecture consisting of a lower-power consumption receiver and a rectenna. The use of DC power converted from the rectenna gives the system an extraordinarily long operational lifetime.

BACKGROUND

Conventional rectenna systems have been developed for large power reception and efficient power conversion. Applications of this technology are typically large power transfer systems, which require a large-scale array.

INNOVATION

This innovation is the first rectenna technology proposed for small-scale personal use. The device receives a microwave or RF signal sent by a transmitter and the received power is delivered to a microwave or RF receiver and also to a rectenna. The receiver recovers the transmitted data or voice signals while the rectenna generates DC power to be supplied to the receiver. This reduces the demand on the DC power supply, which results in longer battery life.

APPLICATIONS

1. Low power, short-range wireless sensors, such as:
a. RF Tags
b. Security access systems

ADVANTAGES

1. The system can be operated by DC power converted from the rectenna, giving it a very long operational lifetime
2. The system can be efficiency designed for a compact rectenna and an RF receiver without bandpass filters
3. The multi-function use of a single antenna reduces the overall size and complexity of the entire system
4. The receiver is based on the self-heterodyne scheme, which eliminates a power-hungry oscillator
5. Separate circuits for RF and DC power generation are no longer needed, as both functions are integrated into a single circuit structure

STATE OF DEVELOPMENT

A prototype system has been designed, implemented, and verified. The system is efficiently integrated together with a dual-fed circular sector antenna. The receiver has been designed using a low-noise amplified (LNA) with low power consumption and a self-heterodyne mixer. The rectenna achieves high conversion efficiency up to 80% as a result of the harmonic rejection of the circular sector antenna. The rectified DC power from the rectenna is applied for a bias of the LNA without any external bias. Simultaneously an ASK digital signal demodulator without extra power supply has been implemented successfully.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,853,223	12/14/2010	2005-682

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OTHER INFORMATION

KEYWORDS

electronics communications antenna

CATEGORIZED AS

- **Communications**
  - Wireless

RELATED CASES

2005-682-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Polarization Standing Wave Cavity Assisted By Anisotropic Structures
- Backfire-to-endfire Leaky-wave Antenna

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