

Patent Licensing Opportunity

Novel PSK modulation method and demodulator that doubles transfer data rates

Industrial sector

Information & communication technologies

Applications:

Wireless communications

Invention executive summary

IFAE has developed and started international patent protection for a new method of modulation and demodulation of Binary PSK and Quadrature PSK signals that doubles the data rate of current communication systems based on BPSK or QPSK modulations.

State-of-the-art

Internet of Things (IoT) is expected to be a big market for the coming years. Some business scenarios remark the simultaneous connection from about 13 billion devices today up to 50 billion devices by 2020. Ultra-low-power communication standards play a crucial role on the implementation of the IoT-connected devices that will be extensively used.

Ultra-low duty cycle operation is required for devices powered by either rechargeable batteries or by energy harvesting schemes. Using N-ary modulations such as 16-QAM will reduce duty cycles at the expenses of reduced signal to noise ratios.

BPSK and QPSK modulations offer the highest noise immunity among all digital modulations, therefore they are used in most of communication standards nowadays. The following table summarizes few of the applications where BPSK and QPSK are used.

Name/Standard	Data Rate	Applications
Bluetooth	2 Mbps	Bluetooth
LR-WPAN	200 kbps	Zigbee, Sensor Networks
HR-WPAN	≥ 20 Mbps	Digital Imaging Multimedia
WiMAX	20 Mbps	Wireless DSL
WLAN	1,2-11 Mbps	Wi-Fi
GPS	100 bps	Global Positioning
Satellite DVB	80 Mbps	Video broadcasting

Goal

Companies dedicated to the development of high performance ICT devices based on BPSK/QPSK modulation willing to acquire this IFAE technology through a co-development and/or license agreement.

Patent

PCT Application - 21 June 2016 (priority date)

Invention description

BPSK modulation is based on carrier's phase state transitions of 180 degree. Note that this phase shift can be performed by 3 independent different ways:

1. By multiplying the carrier by a bipolar pulse.
2. By increasing the phase 180 degree with constant amplitude.
3. By decreasing the phase 180 degree with constant amplitude.

The core of the invention is a new BPSK demodulator that can identify which of the 3 paths to perform a 180-degree phase transition was used, so we can encode 2 bits of information per phase transition, compared to 1 bit for the current demodulators in the market.

Since QPSK signals can be generated with two orthogonal BPSK signals, this patent protects as well a new QPSK modulation/demodulation with 4-bits of information per phase transition.

Invention advantages

- Encoding 2 bits of information per symbol for BPSK modulation and 4 bits of information per symbol for QPSK modulation maintaining signal to noise ratio.
- Double the number of channels keeping data rate, or double the data rate keeping the channel bandwidth what reduces the duty cycle and the power consumption of the devices.
- Compatibility with current BPSK and QPSK communication standards.

Contact:

techservices@ifae.es / www.ifae.es



IFAE is a physics research center located in Barcelona, dedicated to design and develop radiation detectors and high-performance cameras for Medical/ICT sectors and fundamental research (CERN, ESA, ESO).