

# LOW ENERGY WI-FI® COMMUNICATIONS FOR THE IOT IN A WIDE AREA

**P** PATENTED TECHNOLOGY



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## ABSTRACT

The invention consists in a communications system to send/receive data blocks (700 bytes maximum) between a base station and a set of Wi-Fi® sensors without any active data link (active Wi-Fi® network connection). A base station has a coverage area between 12 km<sup>2</sup> and 30 km<sup>2</sup> without obstacles.

The system provides broadcasting and unicasting communication modes. It's the most efficient solution for unidirectional communication of the sensors to a base station. It reduces the power consumption of Wi-Fi® chipsets (does not require an active Wi-Fi® connection) and provides more security because it's immune to the DoS attacks on Wi-Fi® WPA2 chipsets.

The technology can be used in applications for the Internet of Things (IoT) in order to interchange data between sensors and Internet using a single Internet connection in the base station.

## TECHNOLOGY ADVANTAGES AND INNOVATIVE ASPECTS

### MAIN ADVANTAGES OF THE TECHNOLOGY

The technology provides a set of advantages to improve limitations of communications between Wi-Fi® sensors and Internet:

- Reduces the power consumption of Wi-Fi® sensors when sending/receiving data.
- Increases the coverage area for a Wi-Fi® communication from 100 meters until 3 kilometers, according to the prototype used.
- Reduces the infrastructure costs, substituting multiple Wi-Fi® access points for a single base station.
- Reduces the economic costs of the Internet connectivity of the sensors. It uses a single Internet connectivity at the base station, therefore, it not exist an economic cost associated with each sensor.
- Immunity to WPA2 Wi-Fi® DoS (Denial of Service) attacks of authentication, allowing the use of WPA2 chipsets with total security.
- Communications encryption using pre-installed 128-bit AES keys.
- Compatibility with Wi-Fi® 802.11ah (Wi-Fi® HaLow) chipsets that allow greater carrier range in the ISM 900 MHz band.

### INNOVATIVE ASPECTS

The main innovations are the reduction of power consumption and the increase in coverage area for Wi-Fi® sensors in the Internet of the Things (IoT) applications, using the Wi-Fi® WPA2 chipsets already on the market.

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#### MARKET APPLICATIONS

The technology can be applied in IoT solutions where there is the need to use low power and wide area Wi-Fi® communications with sensors. For example:

- Sensor deployments for agriculture applications (smart farms).
- Sensor deployments for big infrastructures (stadiums, bridges, sea ports, etc.)
- Sensor deployments in areas with no coverage of mobile data service (GSM/UMTS) like forests, high mountain or sea.

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#### COLLABORATION SOUGHT

Researchers are looking for companies acquiring the technology for implementation in their products. It is possible to reach license agreements.

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