

IOT FOR CANOPEN

## Connecting sensors to the clouds

**White Bream (NL) designs and manufactures industrial control electronics for various Internet-of-Things (IoT) style of applications based on CANopen.**



The WiCAN gateway connects wireless sensors to CAN-based networks (Source: White Bream)

White Bream is a privately owned company established in July 2000 and member of the [CiA association](#). As of June 2018, it is operated out of a business unit on industrial park 'De Bosschen' in Oud-Beijerland, Netherlands. Before the current line of industrial control products, the company ventured for a while with some smaller products and projects for automotive computing, such as the Mini-ITX car power supply. That was followed by a somewhat more sophisticated approach: The Unigo mobile computer for logistic systems. It is aimed at various specific applications, each application having its own dedicated connectivity set. After some years of reasonable success, the company saw the rise of low-cost Android-based mobile computing. This resulted in the Intel-based PC solutions becoming less and less attractive. In addition, the short lifecycle of PC products were too costly and demanding for a small business like White Bream. With the CAN•net product line of CANopen-connectable products, the company intends to get a more comfortable development cycle.

problems are eliminated. Typical applications include record measurements from an array of load-cells to monitor loading on struts or pull forces on suspension wires. Monitoring power consumption of machinery and equipment in a production line is another application example. This can be coupled with temperature and humidity sensors as well as with vibration sensors to detect wear and tear in rotating appliances. Another example is observing of ambient data in a factory environment to optimize heating and air conditioning as well as monitoring air quality.

CAN•net is an IoT solution for sensor linked to a wired CANopen network. Due to the wired CAN-based approach, power supply challenges and communication

### Integration of wireless sensors

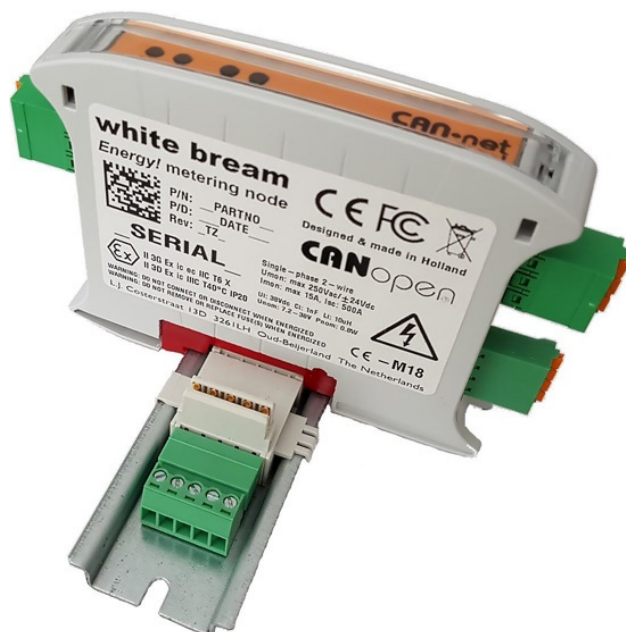
Not all sensor network applications can deal with the wiring involved with a wired CAN interface. Sometimes there is just a gap that cannot easily be crossed with a wire. Other times it is just not practical, for example because the system is a temporary setup, which does not warrant clean installation of the wiring involved. Therefore, White Bream has developed the IP67-rated WiCAN, a wireless solution for CAN connectivity. The gateway between CAN and the wireless network is based on the [CiA 315](#) generic frame for wireless tunneling of CAN messages and for transfer of diagnostic data specification. The WiCAN concentrator provides multiple CANopen interfaces.

The WiCAN device can also be used as bridge between several CAN networks. In CANopen modus it can regenerate SYNC messages. It is transparent for J1939 or other higher-layer protocols using 29-bit IDs. The wireless [IEEE 802.15.4](#) XBee interface supports more than 100 nodes. They are configurable via CANopen or via PCs using the micro-USB port.

The wireless interface uses the [2.4-GHz band](#) and provides a maximum bandwidth of 100 kbit/s. The maximum indoor distance is 60 m. The outdoor distance is 1200 m. FIFOs (first-in first-out) allow for buffering of bursts on either side. Separate priority FIFOs help in preserving timing of messages with  $ID \leq 100_h$ .

The implemented SYNC message PLL on receiving devices reduces radio latency jitter effects. The WiCAN bridge supports LSS node-ID assignment and Fastscan as specified in the [CiA 305](#) layer setting services (LSS) specification. It also supports firmware update via wired or wireless CAN interface, including firmware of the [XBee radio module](#). Additionally, the product features power monitoring and management functions as specified in the [CiA 302-9](#) energy saving document.

Connecting CANopen devices over a wireless link strips some of the reliability and ruggedness features of the CAN network. Additionally, there are bandwidth limitations. Use of more than two bridge devices in a network results in multicast transmissions, which decreases effective bandwidth proportionally to the number of bridges. When the wired bitrate and message



rate exceeds the available RF bandwidth, increased message latency can occur. This leads ultimately to message loss.

*The CANopen AC/DC metering module of the CAN•net product line complies with CiA 302-9 and the CiA 458 CANopen device profile for energy measurement devices (Source: White Bream)*

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