

## IoT-Bus – Fieldbus for the Internet of Things

**The IoT-Bus is a fieldbus with IPv6 support and an integrated security concept. The IoT-Bus combines the advantages of native Internet-Protocol support with the benefits of a fieldbus in terms of range, reliability, robustness and latency.**

In the context of the increasing cross-linking and digitization for Industry 4.0, energy management and facility management, IP capability within the terminal node is becoming more and more important. The Internet of Things (IoT) has stringent demands on data rate, range, reliability, cost, flexibility, interoperability and in certain cases also data security. Consistency of the protocols and seamless data-flow across different domains is essential to enable the Internet of Things. Internet connectivity holds security risks in manners of data integrity, manipulation and tampering. With the IoT-Bus, the Fraunhofer Institute for Integrated Circuits IIS is currently developing the first fieldbus with native IPv6 support and an integrated security concept.

The IoT-Bus is based on the standards IEEE 802.15.4 and 6LoWPAN and uses a twisted pair interface driven by RS-485 transceivers. To keep the compatibility with the 6LoWPAN header compression the IEEE Std. 802.15.4 protocol was adapted accordingly for wired communication. This conformity allows a fast package routing between the wired IoT-Bus and wireless based networks without extensive protocol conversion. It bridges the gap between narrowband and wideband communication technologies within the IoT communications portfolio and offers a simple wired solution to connect sensors and actuators with the IoT and thus enables IPv6 networking.

To ensure best possible cyber security, the communication protocol has to offer end-to-end encryption, authentication and access restrictions. In order to achieve the targeted reliability of the data exchange and control processes, a wired communication is often the preferred solution, especially for the use in exposed environments like production sheds and industrial plants with electromagnetic interferences (EMI). An additional reason for a wired communication channel could be stringent requirements for long distance communications in conjunction with sufficient data rate demands. Wireless narrowband communication technologies (e.g. ZigBee IP) cannot meet these requirements without multi-hopping if it is possible at all. Many field buses meet some of the aforementioned requirements but are very expensive and lack native Internet-Protocol (IP) support, internet connectivity is usually achieved by the use of an additional gateway which performs protocol conversions.

Due to the IP and real-time capability, the IoT-Bus is ideally suited for a wide range of applications within Industry 4.0, building automation and energy management. It enables communication between industrial plants, local equipment, energy generators and the internet. System components and sensors can easily be connected to the IoT for condition monitoring. In addition, production plants can exchange information about the IoT-Bus. Existing systems can be retrofitted with an IP capability. For machines with CAN protocols, it can also be used as a range extender. With the IoT-Bus, production companies or complex buildings will be prepared for the new digital age.

With the IoT-Bus we are able to implement a network over a distance of up to 500 meter at a bit rate of 1 Mbit/s. The IoT-Bus forms a cross-media communication protocol and unites the two worlds of WPAN and fieldbuses without complex protocol conversion. The IoT-Bus bridges the gap within the IoT communications portfolio and offers a simple wired solution to connect sensors and actuators and thus enables the networking of system components.

Please see for more information: [www.iis.fraunhofer.de/iotbus](http://www.iis.fraunhofer.de/iotbus)