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IoT-Bus FOR LIGHTING CONTROL

A RELIABLE AND ROBUST COMMUNICATION BUS FOR THE INTERNET OF THINGS

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Secure Communication for IoT

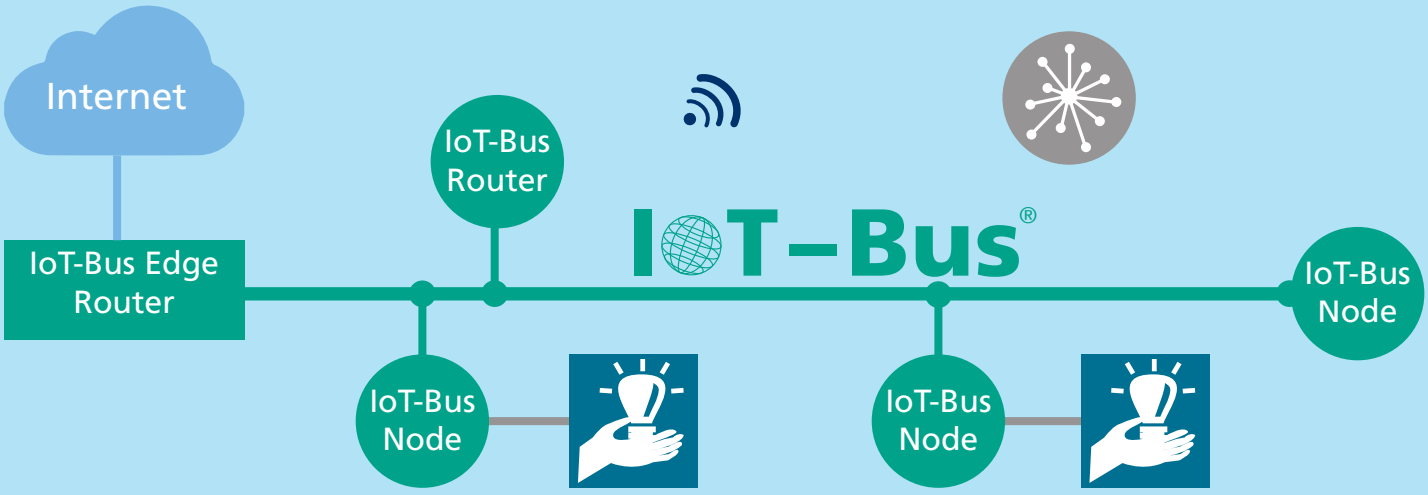
The Internet of Things offers new opportunities also in the field of lighting to make everyday life more pleasant and implement new application ideas. Individual lamps can be optimally adjusted to the respective needs and environmental conditions, for example. Consistent communication via the Internet Protocol IPv6 down to the end nodes enables uniform and standardized communication and simplifies the implementation of new applications.

Fraunhofer IIS develops the IoT-Bus for a secure, wired and bus-capable communication. The IoT-Bus is the first fieldbus with native IPv6 support and an integrated security concept. It combines the advantages of native Internet Protocol support with the benefits of a fieldbus in terms of range, reliability, robustness and low latency. Furthermore it bridges the gap within the IoT communication portfolio between narrowband and broadband communication technologies and offers an easy to use wired solution to connect devices, sensors and actuators directly to the IoT.

Background and Motivation

Due to various use cases in the IoT world, a wired communication technology for the local communication in buildings and premises is needed. It should combine IP support, ranges of several hundred of meters and sufficient data rates, low latencies, low energy consumption and reasonable costs. With the IoT-Bus, new business models such as Light as a Service are much easier to implement. It can take over the direct control of the lamps in a building and thus implement individual lighting designs.

The IoT-Bus is the answer for a secure and affordable communication between lamps and the IoT and also for retrofitting.



Functionality of the IoT-Bus

The IoT-Bus is a combination of wired and radio communication technologies. It is based on an adaption of the technical standard IEEE 802.15.4 for Wireless Personal Area Networks (WPAN) and sensor networks for the use on a wired medium. Due to this relationship to the IoT-Bus is prepared for a seamless cross-media communication between wired and wireless domains.

Thus, the IoT-Bus can be expanded easily with wireless IEEE Std. 802.15.4 nodes. In order to enable IPv6 capabilities the 6LoWPAN adaption layer is applied. Thereby the IoT-Bus is prepared to support standard protocols like OPC-UA, MQTT and CoAP. By using a token-based media access method, the IoT-Bus facilitates real-time communication.

The physical interface is currently based on the standard EIA-485 (RS-485), but further interfaces can be integrated on request. A communication over at least a two-wire cable is supported. In addition to the data communication, a four-wire solution also offers power supply to the communication nodes.

IoT-Bus for Smart Industrial Lights

The IoT-Bus enables communication between lighting, floor shop infrastructure, local resources and the internet. Additional sensors such as presence detectors, temperature sensors or brightness sensors as well as manual light switches can be flexibly integrated with the IoT-Bus or via radio without protocol translation or gateways.

IoT-Bus for Smart Office Lights

In office buildings more user interaction is required. Mobile devices and laptops as well as room occupation scheduling can interact seamless with the lighting control. Also on the personal lighting preferences in the office can be entered automatically. Depending on the requirements of the employee, the light conditions can be adjusted according to different profiles and brightness levels.

IoT-Bus for Smart Building Lights and Infrastructure

Not only lighting, but also other building infrastructure like thermostats, blind controls, and emergency lighting systems can be connected to the IoT-Bus. So it becomes a building automation bus with simple cabling and direct connection to the internet and the IoT world.

With the IoT-bus, new business models such as „Light as a Service" are easier to implement. It can take over the direct control of the lamps in a building wing and thus allow the implementation of individual lighting designs. Especially in the lighting sector, IP capability and protocol consistency make it easier to implement innovative ideas with the IoT-Bus than with comparable existing technologies.

The optional point-to-point encryption by means of standardized methods provides security against cyber-attacks.

IoT-Bus for Future LED Lighting Systems

For energy efficiency reasons future LED lighting systems will be low voltage DC driven. So only one cable with four wires is necessary: two wires for supplying power to the LED lamp, the control application and the communication node and two wires bearing the communication.

Unique Selling Propositions

- Prepared for OPC-UA, MQTT, MQTT-S and CoAP protocol support
- IPv6 support
- Real-time capability based on a deterministic media access method
- Range of up to 500 meters with a 1 Mbps data rate
- Data-container model for payload
- Scalability and modularity of the IoT-Bus
- Integrated power supply of the nodes for easy installation
- Point-to-point encyption

Your Benefits

- Realization of new business models
- Sustainable due to IPv6 support
- Prepared for standard protocols
- Higher range with moderate data rate than competing technologies
- IP capability of the end notes
- Simple installation
- Adaption to your needs
- Well equipped for the future