

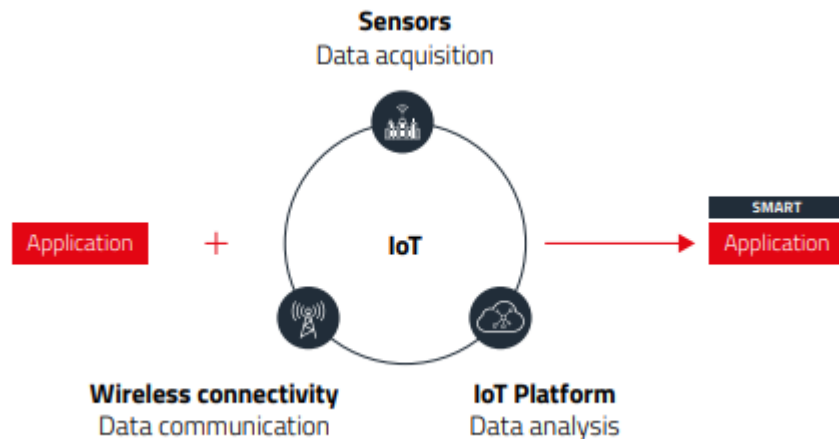


IOT – INTERNET OF THINGS

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

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What is IoT ?



The Internet of Things (IoT) can be broadly defined as an umbrella term for a range of technologies that enable devices to connect and interact with each other. Interacting devices and the data they generate, provide for a range of new applications. Industrial automation, healthcare, home automation, smart cities, smart grids and smart farming are some of the areas in which IoT provides substantial benefits. Dubbed the "fourth industrial revolution", Industry 4.0 or also known as M2M, the Industrial IoT (IIoT) is the digitization of industrial assets and processes that connects products, machines, services, locations/sites to workers, managers, suppliers, and partners. Closer networking of the digital world with the world of machines holds the potential for profound changes in global industry and, therefore, for many aspects of private and social life - to the way we work and live.

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Why IoT ?

The process of capturing data in the field, transferring the same on to a data platform and further analysis of the same can lead to several benefits such as:



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ELEMENTS OF AN IOT SYSTEM

An end-to-end IoT solution consists of the following components:



Sensors and actuators:

This is a part of the system that directly interfaces with the physical environment. Sensors measure the state of the environment and interpret the same as digital data. On the other hand, actuators activate a physical change in the measured environment. Advances in the field of electronics in general and semiconductors in particular has led to the availability of a wide range of sensor and actuators which are highly efficient and yet very compact.



Wireless connectivity:

Sensors and actuators are typically installed in devices with limited access to the digital world. Consider, for example, a temperature sensor mounted inside an industrial boiler. Wireless connectivity provides in addition to many advantages the reachability necessary for such applications. A wide variety of standard as well proprietary wireless connectivity solutions are available today. Several factors including range, throughput, spectrum regulations, local statutory requirements and power budget determine the choice of wireless connectivity solution. Modern embedded designs usually combine the above components into a single embedded device interacting with a gateway.



Gateway device:

A gateway device acts as a bridge between the physical and the digital worlds. It interprets the multitude of wireless connectivity protocols, collects the data and forwards the same in a format understood by entities above. In certain applications the gateway device also performs basic analytics like threshold detection.



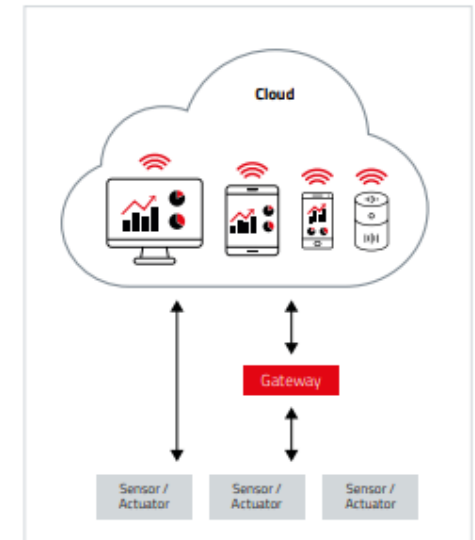
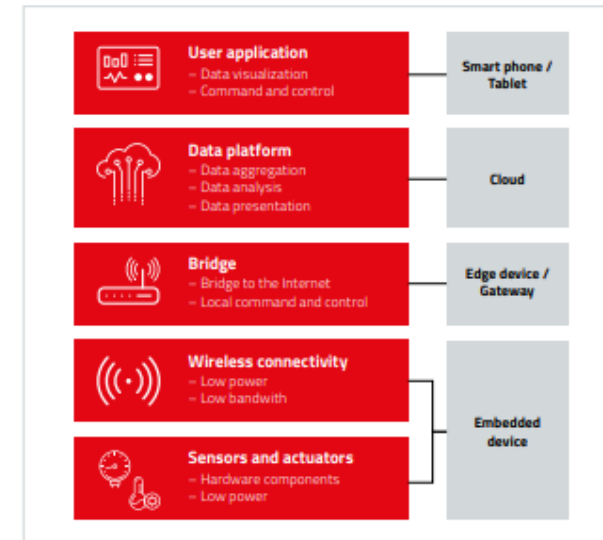
Data platform:

This is the platform where the data is finally stored and presented for further analysis. Options here can range from a local database to cloud server with redundancies. The data platform enables the use of technologies like Artificial Intelligence (AI) and Machine Learning (ML) to perform advanced data analytics that generates value additions to the application.



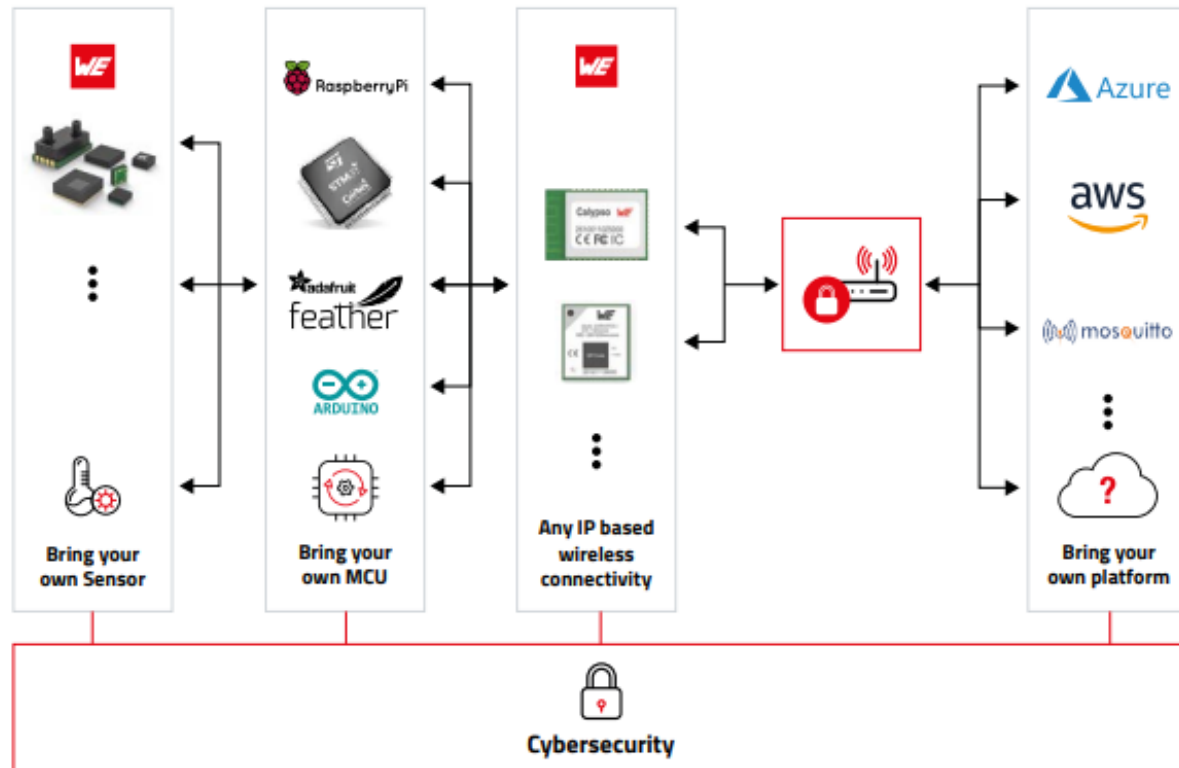
User application:

This is the interface between the human users and the digital world. Here the status of the observed environment is presented in human readable format. The user can take the necessary actions by interacting with this application.



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BUILD YOUR OWN IOT APPLICATION

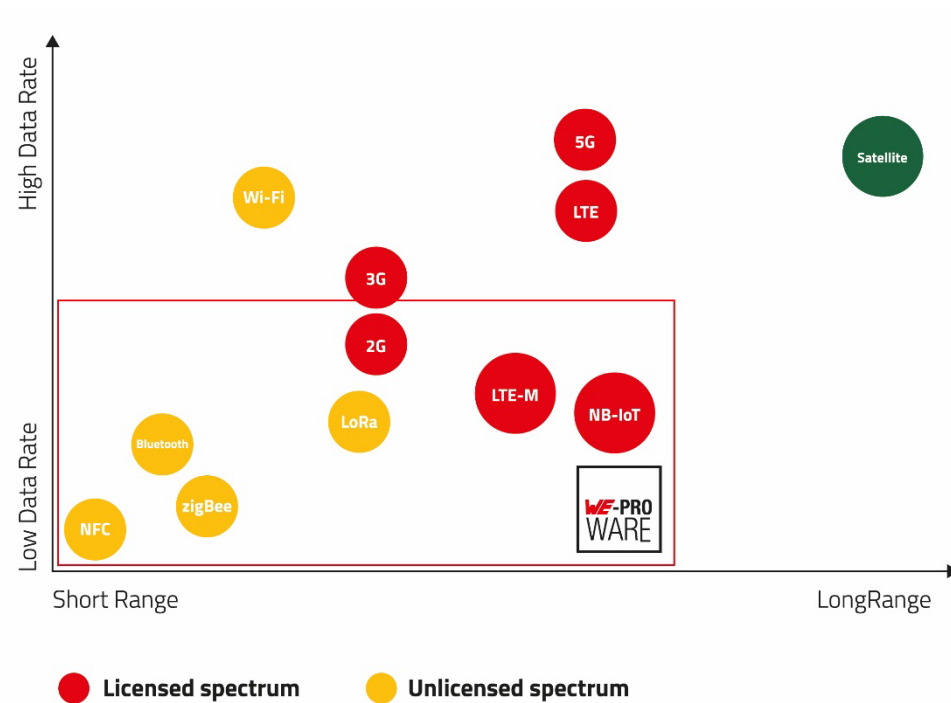


Designing an IoT solution brings with it a number of challenges. Being multifaceted, IoT applications demand a lot of competence from hardware design to UI development. Under such circumstances, it is prudent to take a modular approach. This means breaking down the architecture into functionally independent blocks. Integrating our sensors enables you to monitor the environment accurately. Our radio modules ensure secure connectivity to your cloud platform enabling you to focus on your application and ensuring quicker time-to-market.

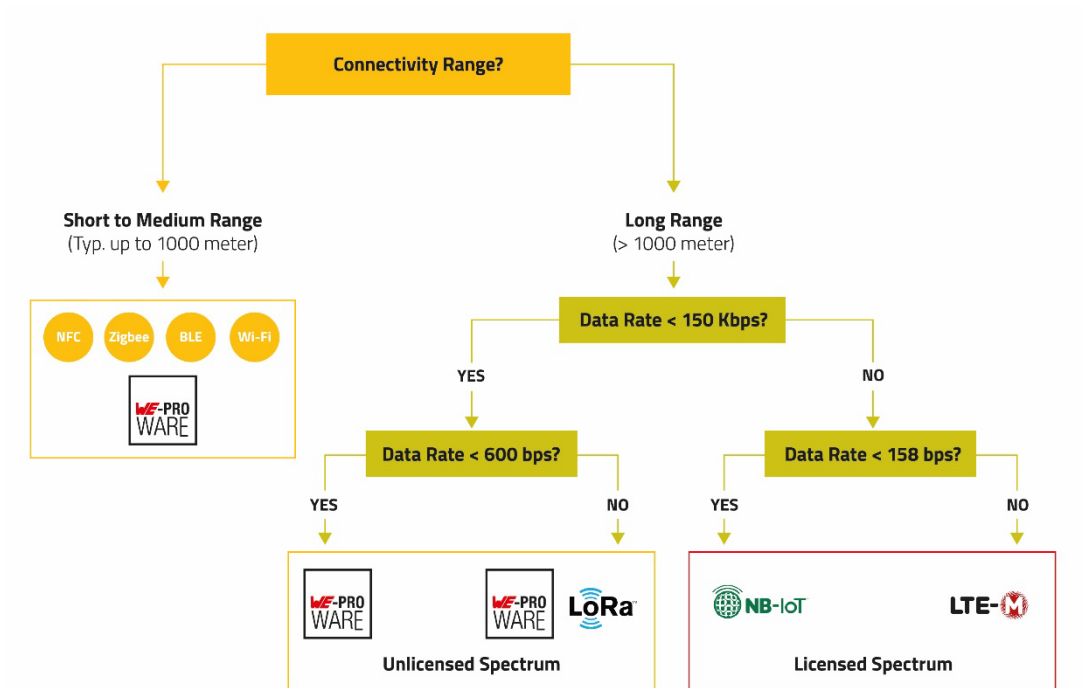
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Protocols and Standards

Overview of different protocols and standards



Choice between different protocols and standards



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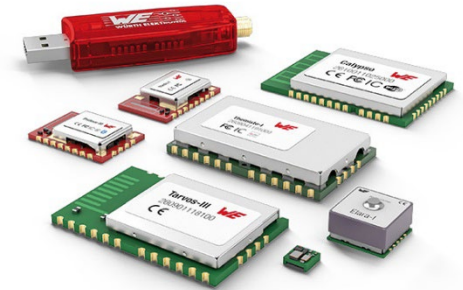
IoT and Würth Elektronik

The Internet of Things (IoT) is the ubiquitous network of physical objects/devices or "things" embedded with electronics and connectivity in order to achieve greater value and services by exchanging data with the respective manufacturers, operators or other connected devices. Various studies predict large growth rates for the Internet of Things in the coming years. Innovative wireless technologies, which are also energy-saving, make a significant contribution to this development.

Würth Elektronik eiSos provides device manufacturers with wireless technologies based on several RF standards and frequency bands, which are suitable for IoT networking. The application areas are versatile: Wearables, Connected Home, environmental monitoring, infrastructure management, manufacturing, Smart Metering, medical/healthcare systems, building automation, transportation and large scale deployments and many more.

WE Modules:

- [WLAN Modules](#)
- [Bluetooth Modules](#)
- [LTE Module](#)
- [Calypso IoT Design Kit](#)



ANTENNAS IN IOT

There are three general types of antennas used in IoT: wire antenna, PCB/trace antenna, and chip antenna. Each type has its pros and cons.

Common types of Antenna topologies in IoT:

Wire antenna

- Low cost
- Easy design
- Space constraints

PCB/trace antenna

- High performance
- Needs sometimes matching
- Needs RF expertise

Chip antenna

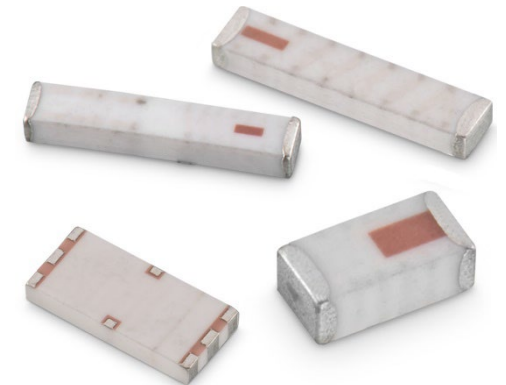
- Small size
- Easy to integrate
- Needs usually matching

Multilayer chip antennas, specifically, have been developed to address the decreased space on the PCB common in smaller IoT devices.

Multilayer chip antennas having many benefits including:

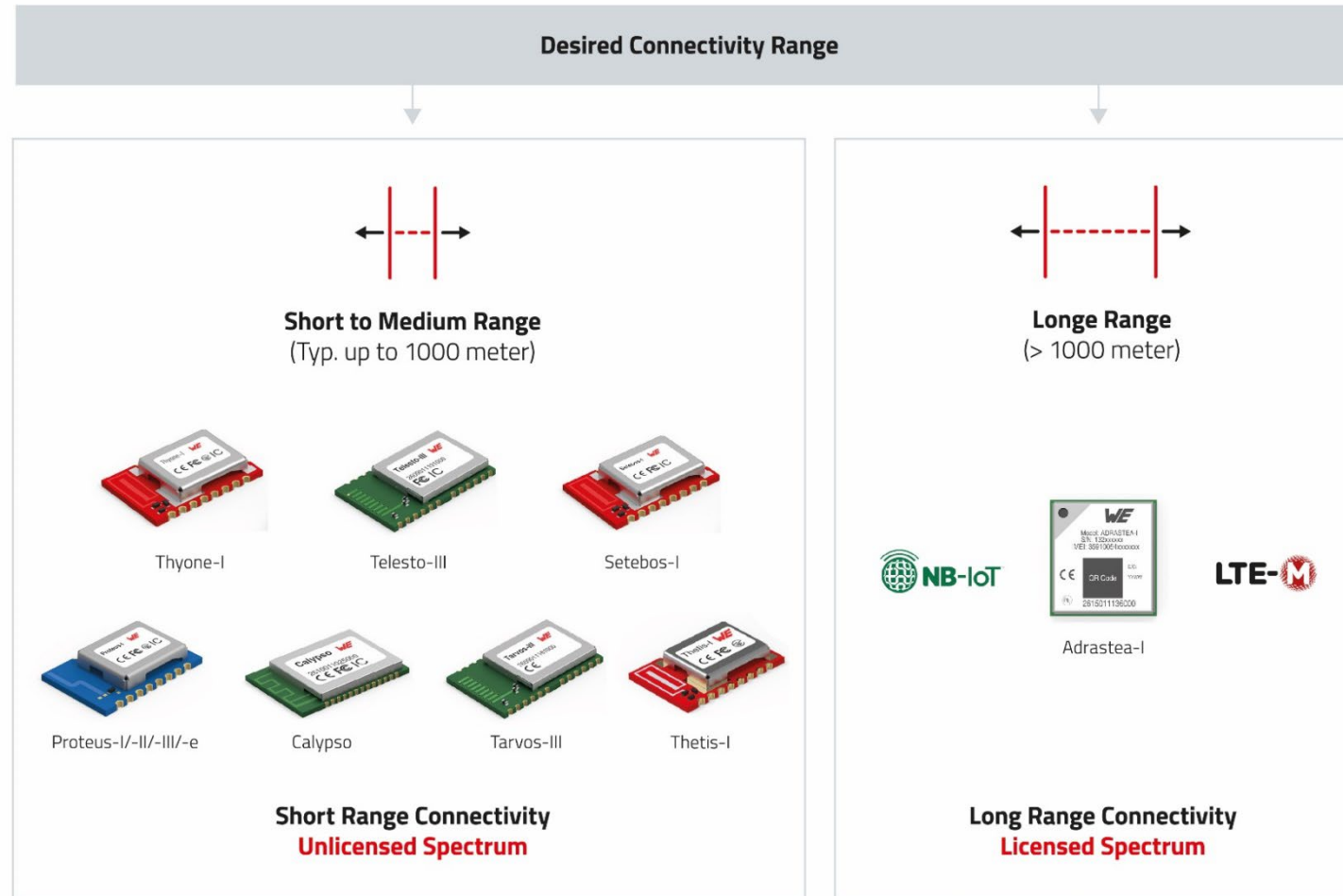
- Multilayer ceramic structure
- High permittivity ceramic mix
- Omni-directional radiation pattern
- Easy to integrate
- Low profile

For more information on multilayer chip antennas, check out our [app note](#).



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Connectivity Range



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Further Information

- [Wireless Connectivity & Sensors Product Guide](#)
- Webinars:
 - [Retrofitting for Industrial IoT using Wi-Fi](#)
 - [Accelerate your IoT development project with our MEMS 3-axis sensor](#)
 - [Making your industrial device IoT compatible with Wi-Fi](#)
 - [Sunset of 2G/3G: Accelerate Migration of Your Cellular IoT Products Into 5G](#)