White paper

Real-Time Location Systems (RTLS) for Real-Time Localization

The basis for your digital production and logistics infrastructure

INHALT

ABSTRAKT

Find out how real-time localisation adds value in practice in our latest white paper.

Reduce search times and optimise your material flows through the dynamic real-time localisation of all relevant objects in your production. With K-RTLS, you implement your individual digitalisation strategy - and drive the transformation of your company in production and logistics.

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MANAGEMENT SUMMARY

Faced with the need to manufacture and deliver products ever faster, ever-more flexibly, and ever-more cost-effectively, medium-sized companies know just how vital it is to invest in digitizing their production and logistics processes, in order to keep pace with the global competition. Internet-savvy customers, for whom the competition is just a click of the mouse away, make this need all the more urgent. Product quality, price, and delivery capability constantly need to be right. This in particular increases the pressure on manufacturing.

"DIGITISATION? YES, BUT PLEASE MAKE ECONOMIC SENSE.

But what technology is needed? What will have the greatest impact in terms of economic efficiency? What needs to be done to transform traditional manufacturing into self-organizing automated production, i.e. into a *smart factory*?

In this white paper, you will learn why real-time radiolocation, the real-time location system (RTLS), is a key technology, and therefore the basis for your digital infrastructure. You will gain insights into exactly how RTLS enables you to manufacture flexibly. To map real processes via the *"digital twin"*, you need real-time data. This is the only way in which you can create the basis for making your company Industry 4.0-compatible.

REAL-TIME LOCALIZATION: WHAT IS WHERE AND WHEN

K-RTLS is based on ultra-wideband (UWB) technology, which allows you to locate mobile products and equipment, as well as people indoors with up to +/-25 cm accuracy. UWB technology is precise, fast in transmission, and reliable. It provides the data needed to digitize, and consequently automate your processes. Real-time information on where which tools, for example, are located avoids the need for time-consuming, labor-intensive searches for them. In addition, UWB can be combined with RFID UHF, Bluetooth, NFC, and WLAN. The advantage: Different ranges are covered when tracking assets. UWB is particularly strong here in terms of accuracy, cost efficiency, reliability, scalability, and security.

THE 3 BIGGEST ADVANTAGES OF RTLS

1. No costly searching time
2. Enhanced process quality
3. Basis for digitization and automation

WHEN DOES AN RTLS MAKE SENSE?

What cost-driving practices do you want to eliminate? Which processes do you want to optimize? Take our test! If you answer most of the questions in the checklist below with "Yes", then a real-time location system will not only eliminate these "pain points", but also give your company significant benefits.

Check question	YES	NO
Do you know exactly where all your tools are at all times?		
You do not know the position of all your tools at all times?		
Does the internal flow of materials sometimes, or even frequently stall?		
Do workers often have to spend time looking for material containers?		
Would you like to increase your production throughput, but can't due to a lack of transparency over semi-finished products?		
Do you keep a high safety stock of load carriers, just to be able to react flexibly?		
Do you want your mobile robots and autonomous vehicles to be able to find materials faster?		
Do you lack the necessary data for gaining greater transparency within the manufacturing process via an IoT platform?		
Do you want real-time data that will enable you to quickly switch production lines for orders?		
When it comes to employee safety, do you always know which employees are where?		

Tabelle 1: Beispiel einer Abfragebox

Table 1: Example of a query box

ASSET TRACKING: EXAMPLES OF APPLICATIONS AND INDUSTRIES

Object location tracking is suitable for a wide range of industries and applications. Basically, wherever you need to track assets with high positional accuracy and use digital data to make quick decisions.

Here are a few examples:

To track production and logistics assets

- Transparency over containers, tools, picking carts, forklifts
- Preventative maintenance

To automate production

- Monitor and optimize material flow during production
- Position monitoring of semifinished and finished

To support mobile robots and autonomous vehicles

- Rapid location of parts and materials for efficient automation

To track mobile medical devices in hospitals in real time

- Accelerated location of medical devices, beds, wheelchairs, etc.
- Location and status of patients & caregivers

To keep employees safe on industrial premises

- Access authorization
- Emergency evacuation
- Alarm function in hazardous areas

To locate vehicles

- Localization of containers and vehicles in large warehouses, depots, airports
- Rental car services

HOW THE K-RTLS FROM KATHREIN SOLUTIONS WORKS

To set up the tracking infrastructure, Kathrein RTLS transponders are first attached to the objects to be monitored, e.g. tools, robots, order picking trolleys, etc. The RTLS transponders are then mounted on the objects. The transponders are robust and compact, i.e. specially designed for industrial environments (IP67), and are attached using an innovative adapter mounting system. This makes it quick and easy to tag only those containers that are in circulation. Furthermore, with the Kathrein RTLS transponder, UWB technology can be easily combined with RFID UHF and NFC. This is achieved by the fact that, in addition to UWB communication, one RFID and one NFC transponder each are installed in such a way that data exchange is possible on this lowest layer. This leaves it up to the user which path he wants to use to access the data

The advantage: Existing investments in the UHF RFID infrastructure for identification can continue to be used. Only in areas where precise localisation is required can UWB be implemented in a targeted manner.

The motion sensor integrated in the transponder ensures that only process-relevant position changes are transmitted. As soon as the transponders start their work, they send signals to the Kathrein RTLS network nodes (Nodes), which makes continuous localisation of the objects possible.

The Kathrein RTL system has three operating modes in order to adapt ideally to the applications.

Dynamic Mode
» for fast processes

High Precision Mode
» for precise localisation

Outdoor Modus
» for outdoor applications

A seamless transition of the K-RTLS transponders between the ranges is possible here, as is operation with only one mode.

The received localisation data (ID, position, timestamp) can also be automatically sent to the Kathrein CrossTalk IoT Suite. This software platform is the basis for obtaining raw data and formatting it into the required data structure. At the same time, CrossTalk is also responsible for monitoring the status of the components involved so that the reliability of the system is increased. In addition to the RTLS hardware, the complete AutoID devices can also be stored and administered at a glance

CrossTalk transfers the collected data to higher-level systems, e.g. to the ERP or tools that enable real-time track & trace visualisation.

As an alternative development path, however, a separate interface (API - Application Programming Interface) is available for partners who have developed the connection to customer systems themselves, via which the Kathrein RTL system can be easily integrated into an existing software structure.

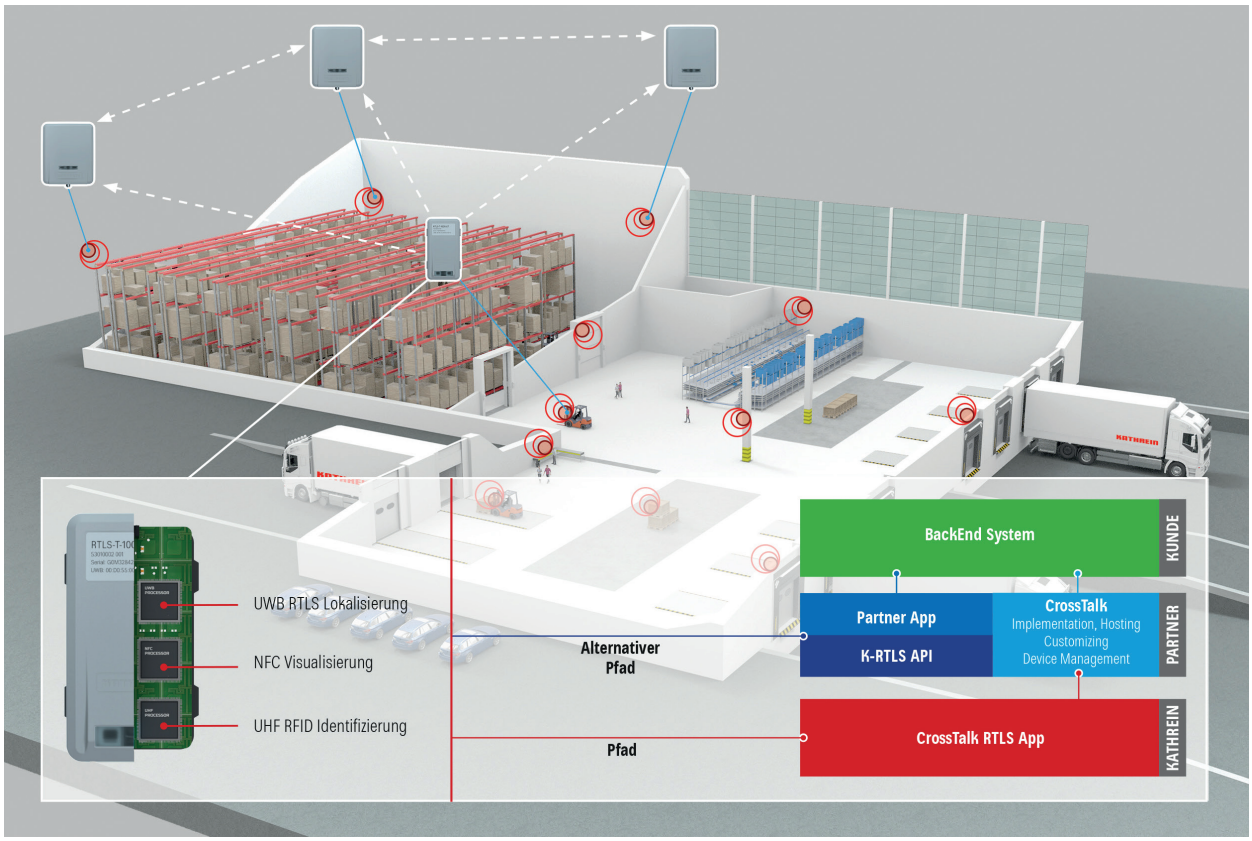

Figure 1: Structure of a complex K-RTLS incl. interaction of the perfect software

Nodes for easy installation

The stationary reference nodes, the RTLS nodes from Kathrein Solutions, can be installed quickly and easily, at up to 40 m apart. They communicate with each other via an Ethernet network, which can also supply them with power (PoE). The K-RTLS thus achieves a localization accuracy of up to thirty centimeters – even in harsh industrial environments with metal and reinforced concrete.

For servicing, a separate radio network can be set up as a backbone network through which the nodes can exchange information to, for example, receive a remote maintenance update or reliably perform their localization work in areas with minimal radio interference.

Connection to MES production systems and other systems

The data obtained via the K-RTLS can and should also, of course, be used for other target systems, such as the manufacturing execution system (MES) and other IT systems, as well as cloud-based applications. The data can also be combined with the robot control system with minimal delay.

It is also possible to compare the RTLS location data with the 3D model of a product stored in the digital twin. The Kathrein K-RTLS thereby provides key data for your company's digitalized infrastructure.

Obtain data, analyze this data, optimize processes

The Kathrein CrossTalk IoT Suite enables you to see all location and movement profiles at a glance. You can even clearly identify adjacent objects. Analyzing this data provides you with valuable insights into your internal processes and unlocks potential for optimizing them. Visualizing processes in near real time enables employees to intervene to avoid any delays in delivery..

THE STRENGTHS OF THE KATHREIN RTLS

Precise and accurate

- Objects can be located with up to +/-25 cm accuracy

Sophisticated

- Can be used in complex environments

Technology

- Three technologies in one RTLS transponder: UWB, RFID and NFC

Kathrein's partners bring RTLS to life

Kathrein specializes in radio technology and the development of sophisticated products. For integration in complex production and logistics processes, Kathrein Solution relies on experienced partners for its customer projects. For connection to MES, production control software, and even provision of a traceability cloud, Kathrein can recommend the right expert partner for the job.

Before the start of any given project, Kathrein works together with its customer and partners to simulate the project setup in the test center in Stephanskirchen. This avoids the need for any time-consuming changes later on. Kathrein also accompanies its partners throughout all phases of the project: from consulting and proof of concept (PoC) through implementation and rollout. Following the go-live, Kathrein provides assistance with support issues.

Summary

Real-time location systems, such as the Kathrein RTLS, locate objects in seconds and with +/-25 cm accuracy. Such positioning provides you with the necessary transparency for achieving high process accuracy and quality. Regardless of whether you use RTLS in your warehouse, production facilities, car rental service, or hospital – the huge cost savings you will make on the time-consuming, labor-intensive search for objects guarantees the investment will make economic sense. In particular since it will lay the basis for digitizing your company. Control over your own assets also enables Industrial Internet of Things (IIoT) communication between assets – e.g. between mobile robots and material containers during production – and thereby creates a reliable basis for the next level of automation in Industry 4.0. This makes RTLS one of the most economic ways to start digitalizing your company

Combining IoT technologies is the springboard to the digital future. Linking UWB with RFID and NFC increases the transparency and efficiency of a solution. Kathrein Solutions implements complex solutions that generate measurable added value within a short space of time.

Emre Gürbüz, Chief Sales Officer, Kathrein Solutions GmbH

ABOUT KATHREIN SOLUTIONS GMBH

From proof of concept (PoC) through to go-live, Kathrein Solutions supports its partners in implementing turnkey projects in the areas of production and logistics, healthcare, automotive and intelligent transportation systems. With seamless integration of all types of identification technology, such as RFID and RTLS solutions, barcode readers and Wide Area Network technologies – we combine the most appropriate feature and generate interfaces with all types of ERP systems and backends. We and our partners offer RF simulation, application support and software integration and implementation, as well as operation and maintenance. First-class service and customer-focused support add the finishing touch to our portfolio.

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