

Localization of Mobile Equipment

Application Note

ZOMOFI®

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Hierarchical localization

Mobile equipment often needs to be localized on a global scale. The concept of hierarchical localization offers an economical way of achieving this.

This approach combines global and local localization technologies and links them to time data. This makes it possible to locate equipment globally - using the low-cost active RFID technology.

Thanks to the ranges of active RFID, localization takes place in a fully automatic manner and in real time.

Key performance characteristics:

- Fully automatic global localization
- Real-time capable process monitoring
- Condition monitoring (sensor integration)
- Low investment costs, especially for large unit volumes
- Straightforward and low-cost maintenance

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The logo for Albis Technologies, featuring the word "albis" in a bold, blue, sans-serif font with a green swoosh above the 'i', and the word "technologies" in a smaller, blue, sans-serif font below it.

Introduction

Mobile equipment is installed, maintained and transported. Accurate, real-time information on current inventories constitutes business-critical information that enables optimal resource utilization.

Delivery and return transports are often carried out using the same means of transport. It is often of great value to simply be able to locate the transport. Once this information is linked to the details of what is being transported, it becomes possible to locate the objects in question all over the world.

The concept combines GPS/GMS with active RFID technologies. The result is an economic solution for large volumes of objects to be managed.

Key business advantages

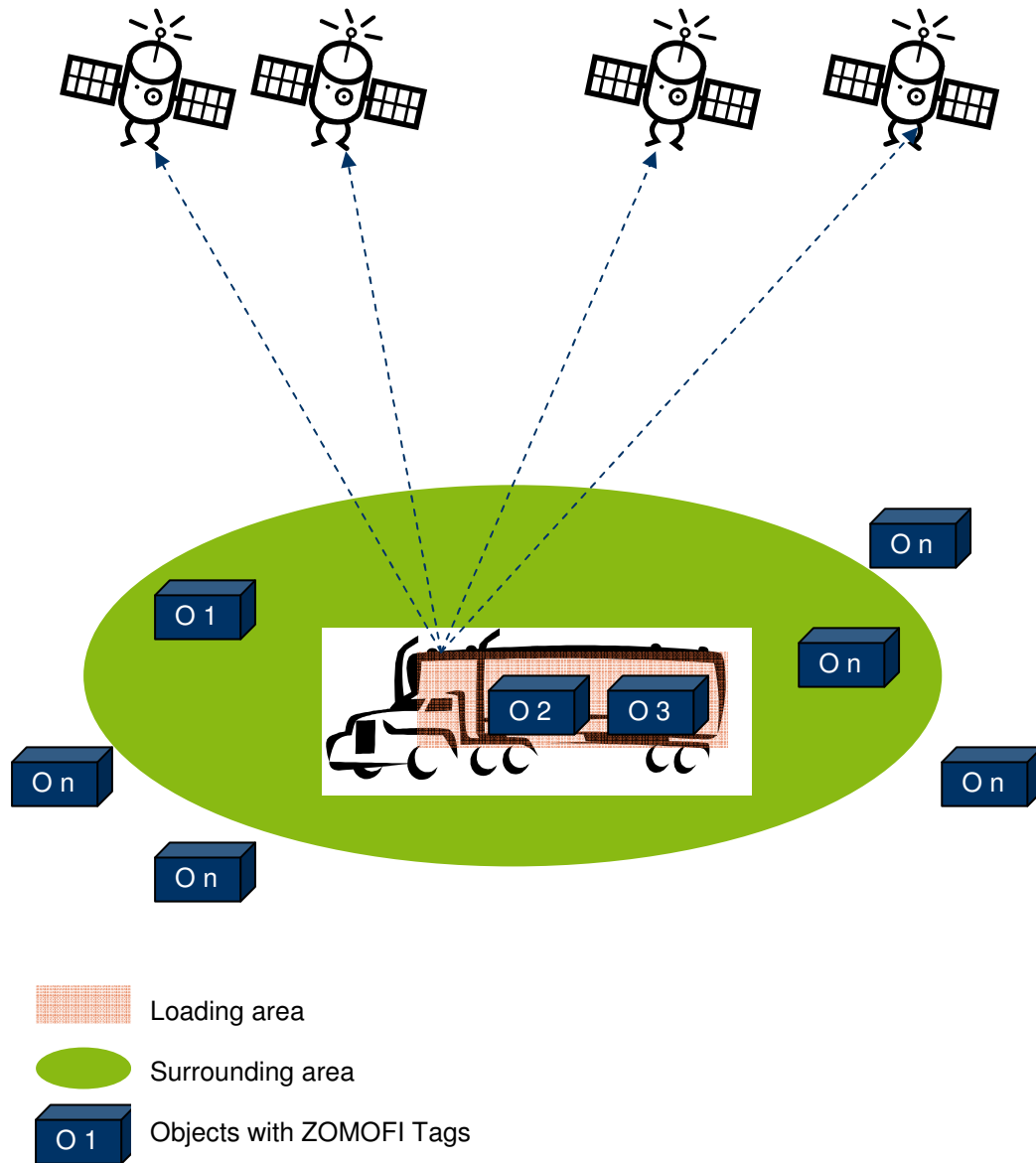
Localization and sensor data in real time: This is the common denominator of all benefits.

Such an achievement contributes towards business process optimization that may include:

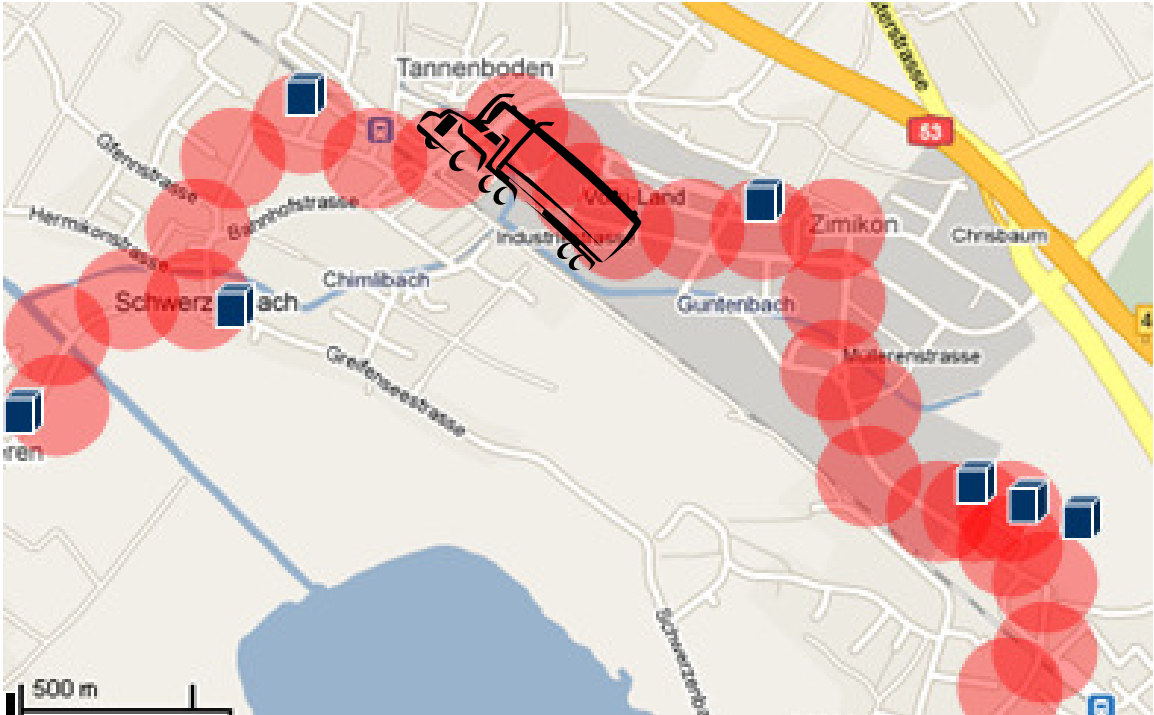
- Reduction of personnel expenses thanks to automated data collection and evaluation
- Reduction of costs caused by errors
- Reduction of process costs
- Reduction of investment costs due to reduced volume of circulating assets
- Increased security/safety

Concept of hierarchical localization

The combination of technologies opens up valuable solution options. In particular, this approach allows for the combination of global localization methods, such as GPS and GMS - with regional localization methods, such as WiFi and active or passive RFID.



The following chart shows how objects are geographically distributed. The system records the position at which the object was last detected. The red circles mark the areas in which the transponder(s) are monitored during the transport.



By also monitoring the transporters' cargo area, it becomes possible to monitor which pieces of equipment are being transported at any given time.

Economic efficiency

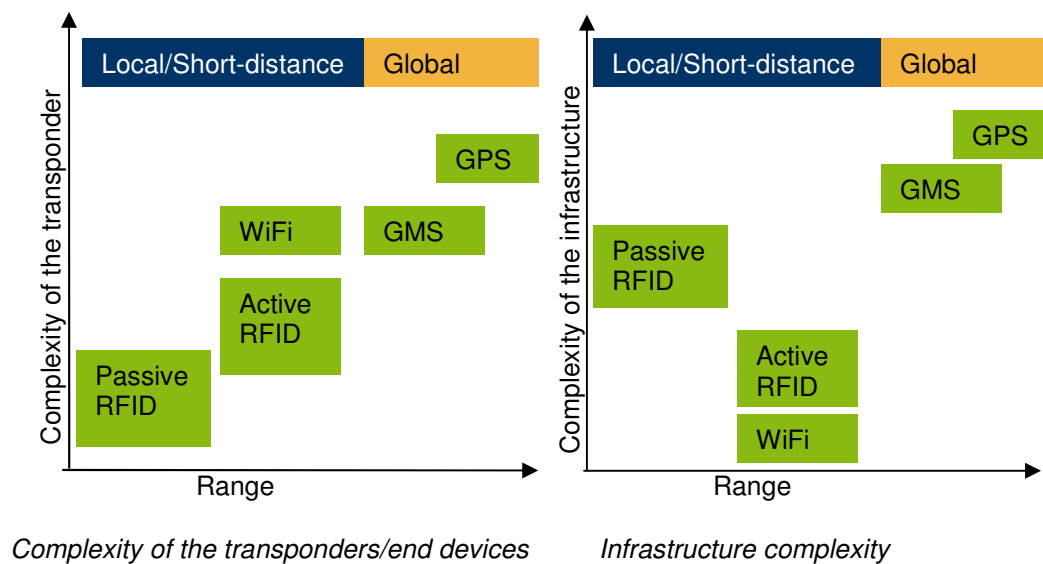
Each of the currently available technologies has its advantages and disadvantages.

The benefits of local/short-distance localization technologies, such as passive RFID and active RFID, lie in the simplicity of their transponders and the associated low purchase cost per unit. The required infrastructure is also significantly less complex and can be positioned in a point by point and targeted manner.

The benefits of global localization technologies lay in their functionality, however, object-level roll outs are not economical.

There are different transponder and infrastructure options within the area of local/short-distance localization technologies. It should be noted that active RFID only requires straightforward infrastructure solutions, while their transponders, however, are more complex than with passive RFID. What this means is that the choice of preferred technology will depend on the specifics of their designated application.

The following diagrams represent how the different technologies are positioned.



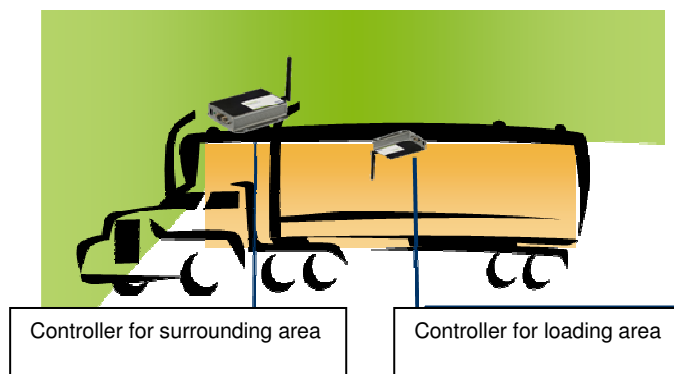
Assembly and installation

Mobile equipment

A ZOMOFI transponder is attached to each mobile piece of equipment. The transponder emits a signal every few seconds. This signal is received by the ZOMOFI controllers as soon as the objects enter their monitoring zones. The ZOMOFI transponder can be affixed to a concealed area since the system does not require direct visual contact between the transponder and controller. The ZOMOFI transponder operates automatically for years after this and requires no maintenance at all.

Transporter

A ZOMOFI controller with a GPS add-on application is installed on the transporter. This add-on application records the geographic location of the controller at any given time.



A second ZOMOFI controller can be installed to detect pieces of equipment located in the vicinity of the transporter. This makes it possible to detect pieces of equipment up to a distance of 160 meters.

Warehouse and maintenance zones

A ZOMOFI controller is installed for each delineated zone and then monitors the respective area. This allows for the monitoring of pieces of equipment indoors and outdoors, the status of which is automatically updated.

Combining ZOMOFI & GMS

It is also possible to use the GMS localization method instead of GPS. This is particularly suitable for conditions in which GPS reception is not possible. However, the localization data provided through this technology is less accurate.

Combining ZOMOFI & Implementation Planning

It is more economical to conduct implementation planning with the help of global localization technology. With this option, implementation planning time information is combined with the ZOMOFI signals. If the project is implemented as planned, then this solution can be used to detect where pieces of equipment are loaded and unloaded.

GPRS Option

The data is generally stored by the ZOMOFI controller until the transporter arrives at a support base. At the support base, the data is automatically transferred to the ZOMOFI Edgeware server via WLAN.

If the information must be available in real time or if no support base is available, then the data can be directly transferred to the ZOMOFI Edgeware server via a GPRS connection.

Positive effects on business processes

Maintenance and storage of mobile equipment

The zones in which the mobile equipment is serviced and stored are monitored individually. This means that it is possible to ascertain the status of a specific piece of equipment.

Data collected	Status	Advantages
The object is detected in the delivery zone	delivered, uncleaned	Data collected automatically. The maintenance planning procedure can be optimized.
The object is detected in the maintenance zone	in maintenance	It becomes possible to measure process times.
The object is detected in the storage zone	stored	Mistakes can be recognized immediately, e.g. if no maintenance took place.
Object is detected in the dispatch zone	ready for loading/dispatch	This ensures that the correct pieces of equipment are delivered.
The object is detected on the transporter	shipment underway	It becomes possible to trace which piece of equipment was delivered by which transporter.

Delivery and return transport

Information collected	Status	Advantages
The ZOMOFI controller on the transporter loading area detects a piece of equipment.	loaded	The system can be set to sound an alarm if a false piece of equipment is loaded.

Maintenance on site

Information recorded	Status	Advantages
The ZOMOFI controller for this area detects a piece of equipment.	in maintenance	It becomes possible to verify when maintenance took place. The service personnel can view how many pieces of equipment were detected. Alerts concerning missing objects can be sent out immediately.