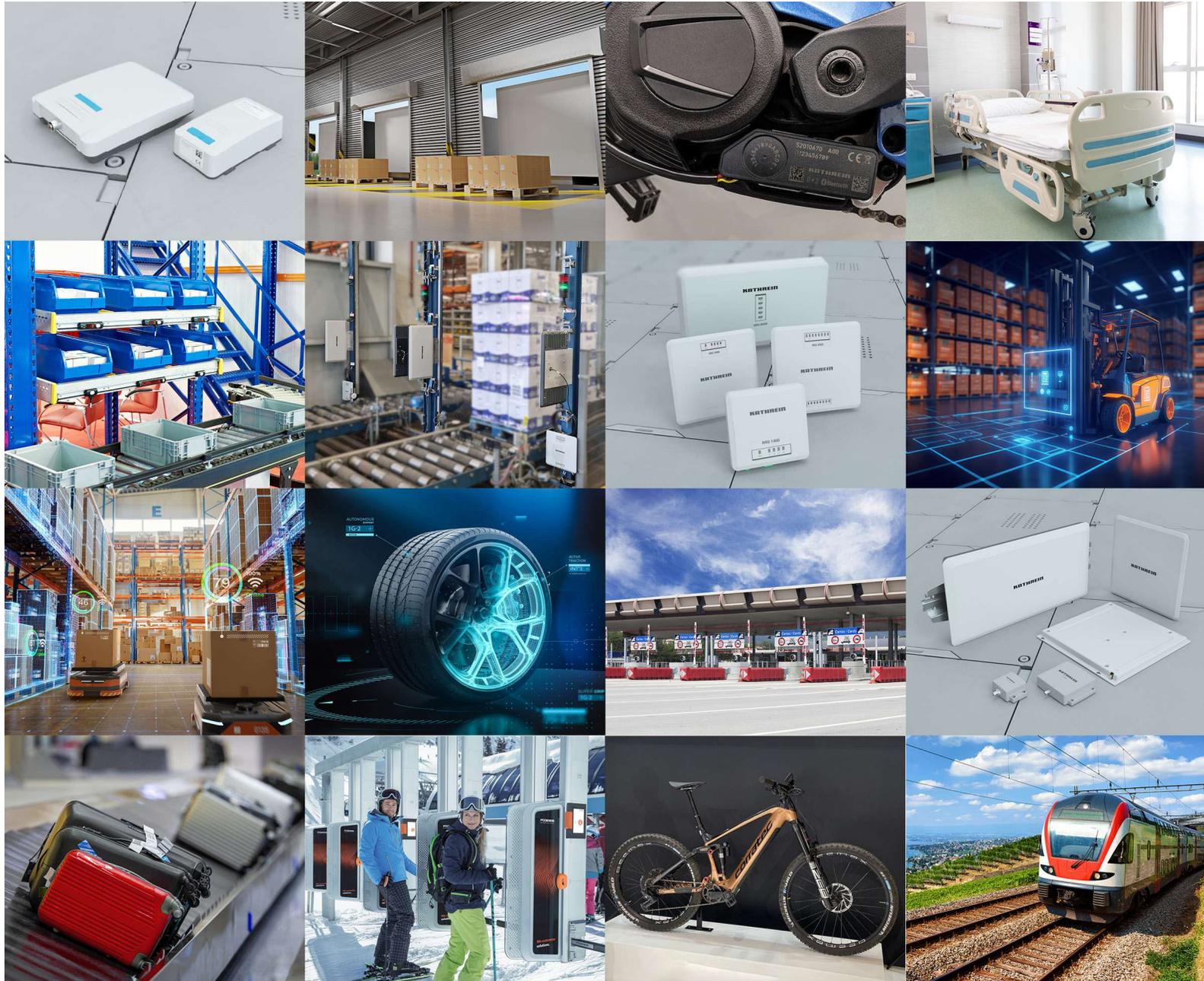


CATALOG

# Identification and localization technologies

RFID and RTLS solutions – software – services



## Enabling Technologies for digital Transformation

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 features and generate interfaces with all types of ERP systems and backends. We and our partners offer RF simulation, application support, software integration and implementation, as well as operation and maintenance. First-class service and customer-focused support add the finishing touch to our portfolio.

### KATHREIN STANDARD PORTFOLIO

#### RAIN RFID hardware

Passive UHF (Ultra High Frequency 860-960 MHz) RFID (Radio Frequency Identification) or RAIN RFID is a passive identification technology that enables read rates of a few centimeters up to 20 meters, depending on the application. From single readings to thousands of transponders, everything is conceivable here.

#### K-RTLS hardware

Kathrein Solutions' innovative UWB RTLS (Ultra Wide Band Real Time Locating System) is an active localization solution. With the possibility to select and combine different localization methods (ToF, TDoA, AoA), the positions of the RTLS transponders can be calculated in real time with an accuracy of less than 25cm.

#### Software & services

For the identification and localization of goods, Kathrein offers its partners the opportunity to use existing software modules to create optimally tailored solutions for the end customer. In compliance with the highest standards, Kathrein also offers a high-quality portfolio of various services and support to seamlessly accompany partners and customers through the entire life cycle of their project.

### CUSTOMIZED SOLUTIONS

#### Identification

To meet the unique requirements of our customers, Kathrein and its partners offer customized identification solutions tailored to specific circumstances and needs: from individually developed RFID systems for wireless identification to custom-built transponders. Our product range includes high-security transponders, windshield labels, headlamp tags and dual-frequency transponders that combine NFC and UHF technology.

#### Localization

For reliable and accurate localization, even under the most demanding conditions, Kathrein relies on individually tailored new developments. The portfolio includes advanced wireless localization technologies, including RTLS (Real-Time Location Systems) and BLE (Bluetooth Low Energy), to effectively address a wide range of localization needs.

#### Software

The software portfolio offers comprehensive support for individual solutions. These can be very complex, filtered event data with backend integration or even raw data push solutions, which are used to create customized, optimally fitting solutions for the end customer.

➤ <b>Company portrait</b>	<b>2</b>	▪ Kathrein Reader!Start software	50
➤ <b>Partner program</b>	<b>4</b>	▪ Kathrein reader application software	50
➤ <b>RAIN RFID reader</b>	<b>10</b>	➤ <b>K-RTLS hardware</b>	<b>52</b>
▪ Reader overview	11	▪ K-RTLS modes	53
▪ RRU 1400 reader series	14	▪ K-RTLS transponder	54
▪ ARU 2400 reader series	16	▪ K-RTLS node	56
▪ ARU 3500 reader series	18	▪ K-RTLS accessoires	57
▪ RRU 4500 reader series	20	➤ <b>K-RTLS software</b>	<b>58</b>
▪ RRU 7700 reader series	22	▪ K-RTLS software overview	59
▪ ARU 7700 reader series	24	▪ CrossTalk software suite	60
▪ ARU 8500 reader series	26	▪ CrossTalk Agent	61
➤ <b>RAIN RFID antennas</b>	<b>28</b>	▪ CrossTalk Server	61
▪ Antenna overview	29	▪ RTLS infrastruktur application	62
▪ Low-range antenna	31	▪ RTLS!Start	63
▪ Mid-range antenna	32	➤ <b>Professional services</b>	<b>64</b>
▪ SmartShelf antenna	33	▪ Professional services overview	65
▪ Wide-range 6060 antenna	34	▪ Consulting	66
▪ Wide-range 7070 antenna	35	▪ Project management	68
▪ Wide-range 40 antenna	36	▪ Training	70
▪ Wide-range 3070 antenna	37	▪ Support	72
➤ <b>RFID accessoires</b>	<b>38</b>	➤ <b>Customized solutions &amp; development</b>	<b>74</b>
➤ <b>Software RAIN RFID portfolio</b>	<b>44</b>	▪ Customized solutions	75
▪ RFID Software overview	45	▪ R&D services	79
▪ CrossTalk software suite	46	➤ <b>Cooperation</b>	<b>80</b>
▪ CrossTalk Agent	47	➤ <b>Pictures</b>	<b>83</b>
▪ CrossTalk Server	48		
▪ CrossTalk Mobile	49		

## Our partner programm

### ➤ Kathrein Solutions relies on partners

Companies that are currently driving forward the necessary digitization of their processes in development, production and logistics are facing increasingly rapid pressure to change. At the same time, the requirements at all levels are becoming more and more complex and comprehensive. Future-proof digitization solutions require an intelligent combination of hardware, software and implementation services. A task that is impossible for just one expert to provide alone. Kathrein launched the Kathrein partner ecosystem on this

basis. The addition of a wide variety of skilled partners to the Kathrein Solutions portfolio creates a highly specialized, skilled and efficient network. Extremely well prepared for complex digitization projects at the customer's premises. Customers benefit from the network of the best possible specialists and quickly available resources. As part of the Kathrein network, partners in turn benefit from access to the project business and professional support in the form of the Kathrein partner program.

### ➤ The partner program: optimally supported during all phases

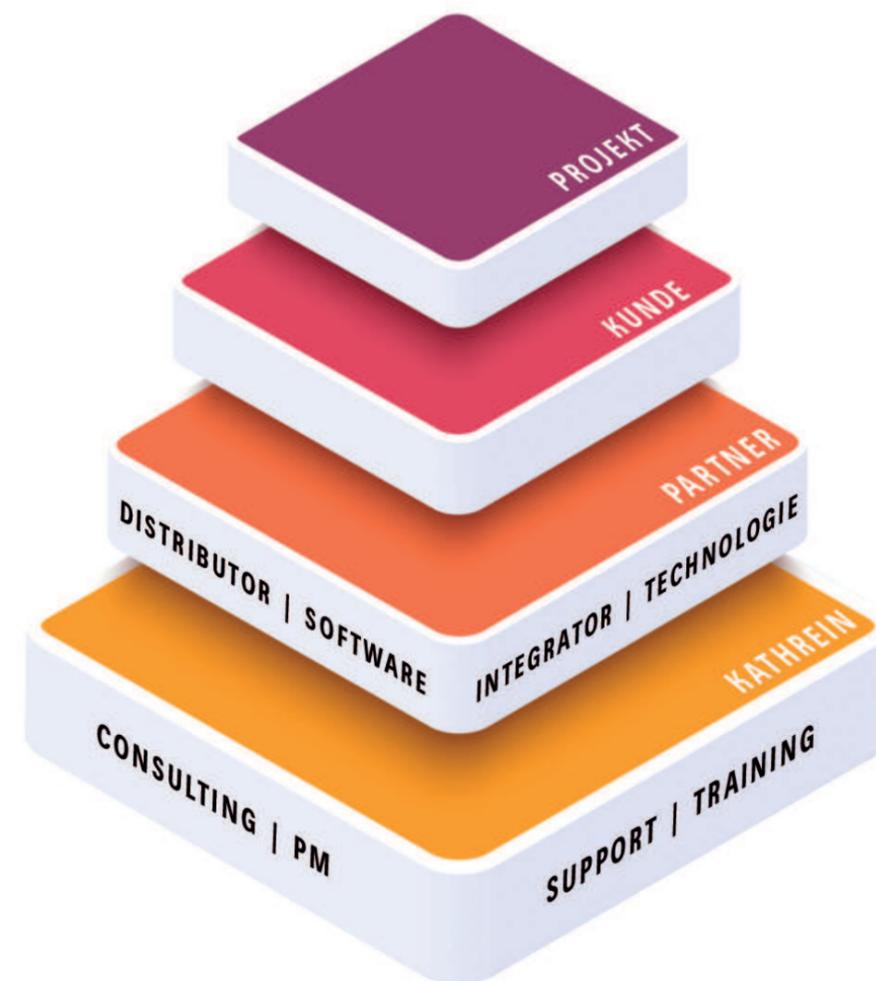


Pre-Sales      PoC / Pilot      Project      Rollout/ Go-Live      Support / Training

The partner program was designed for the optimal support of Kathrein partners and is continuously being further developed. As a partner, we respond to your different needs:

- Distributors
- Process consultants
- System integrators
- Logistics specialists
- Solution partners for industry solutions

As a manufacturer, we provide you with the appropriate support for your project and customer requirements.



With its indirect sales approach, Kathrein Solutions focuses on a competent, global partner network of system integrators, resellers and technology partners. This partner ecosystem offers the necessary know-how and resources to implement holistic digitalization projects. The partners are individually supported in all project phases - from acquisition and proof of concept to roll-out at the customer's premises.

The wide range of conceptualization options based on the Kathrein Solutions portfolio and the extensive partner network is the basis for meeting all application requirements in the context of identification and localization projects.

### > Partner onboarding & training

We prepare you well for your presentation to the customer. In free initial training sessions at our Kathrein Training Academy, you will be given the tools you need to convince customers and provide them with the best possible advice. Our Technology Consulting training course supports you with basic, advanced or personalized training – to intensify the partnership according to your needs and your desire. You can find out more about our training courses at Kathrein Training Academy on our website.

### > Marketing & sales services

Kathrein actively supports you with helpful marketing and sales tools during your acquisition phase. This includes both the mutual lead generation and a well-stocked knowledge base, which you can fall back on at any time. Our webinar and “up-to-date” newsletter series are just a few examples. For your customer presentations, we provide you with the appropriate demonstration equipment and invite you to join us at trade fairs.

Projects that have already been successfully implemented are the best advertising for you in the form of case studies. We write the success story together with you and with the customer's consent and publish it in the appropriate channels after consultation.

### > After-sales support

Together with you as the general contractor, we guarantee the end customer the high availability of their system throughout the entire operating period. If service is required, the customer contacts your second level support. As a fall-back option, we are available to you as the manufacturer with short response times and our third level support team. Our repair service also ensures that components are replaced quickly in the event of a problem. The end customer can therefore always be sure that they will receive competent and prompt help at all times. We would be happy to advise you and your customer on the best support contract model.

### > Pre-Sales consulting

You only have one chance to make a first impression. Your pitch to the customer needs to be well prepared and we are happy to support you in this. We will prepare the content of the meeting together, accompany you to the presentation if you wish, create an initial rough project concept and provide you with everything you need for the budget and quotation calculation. Even at this early stage, you will sense our enthusiasm for the future project.

### > Project support

Even before the order is placed, we give you and the end customer the assurance that the project has been planned precisely. We are able to simulate the final solution set-up under real conditions in our in-house test center. In doing so, we not only check whether all RFID components work well together, and the way in which they need to be configured, but also take a close look at the relevant processes. Kathrein's consulting experts are at your side during this blueprint phase to minimize the project risk and ensure the success of its implementation. Of course, Kathrein also supports you during installation and commissioning and the exciting go-live phase.

### > Kathrein + partner = opportunities

Kathrein Solutions supports you during the entire sales, consulting, implementation, go-live and after-sales phase. You can think of the Kathrein Solutions Partner Program as a useful toolbox, from which you can help yourself according to your needs. You decide which tools you want to use and for how long in order to successfully implement your projects.

In the past, the addition of core expertise has resulted in new solutions that our partners have developed. For example, replenishment management of containers, in-house pharmaceutical cold chain management, or a track & trace solution in the cloud. What will you develop?



**Markets**

- Manufacturing
- Logistics
- Healthcare
- Transportation

**Technologies**

- RAIN RFID hardware
- K-RTLS
- Software
- Laboratory / test centre
- Customized solutions

**Services**

- Pre-Sales
- PoC / Pilot
- Project
- Rollout / Go-Live
- Support / Training

Kathrein partners benefit from broad market access, first-class products and close-knit service. You can also rely on our partnership with:



## ➤ Successful together!

The Kathrein partner program is your enabler to discover and implement promising digitalization projects. Whether you find what you are looking for through targeted lead generation campaigns or through your own efforts, we equip you with the necessary tools to identify and successfully implement projects with your existing and potential new customers. Our range of solutions includes innovative applications such as optimizing the supply chain with eKanban systems in the automotive supply industry, implementing real-time tracking systems for transport containers or tracking and ensuring sustainable production processes. The market offers countless opportunities that we would like to exploit together with you. The areas of application are broad and range from manufacturing, logistics and healthcare to transportation. Benefit from our references in these sectors, which will make it much easier for you to gain access to customers.

## ➤ Take advantage of the Kathrein USPs:

The Kathrein Solutions USPs can be used as a complete portfolio or as individual components (build blocks). The modularity and partner-oriented approach offers maximum flexibility.

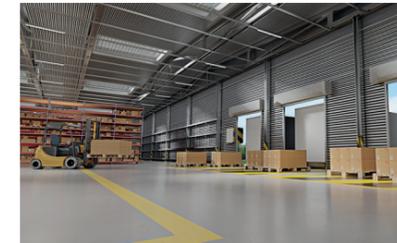
- Broad portfolio of RAIN RFID hardware
- K-RTLS Real-Time Localization
- Software
- Professional services
- Test center for PoCs
- Virtual PoCs (simulations)
- Kathrein Training Academy
- Individual development



Kathrein supports you in the selection and configuration of suitable products for your customer project as well as during all subsequent project phases. As intense as you wish. From the first customer handshake to final acceptance and the subsequent support – you can rely on Kathrein.

## IoT solutions and applications

### ➤ Identification



#### Logistics

- Vehicle logistics
- Incoming goods / outgoing goods
- Floor conveyor systems



#### Manufacturing

- Assembly line
- eKanBan
- Small load carrier



#### Transportation

- ITS (identification, registration, tolling)
- Rail logistics
- Fleet management



#### Healthcare

- Locating medical devices
- Textile management
- Access control



#### Hospitality

- Event management
- Laundry management
- Waste management



#### Access control

- Ski Gates
- Stadiums / Arenas
- Protected areas in companies

### ➤ Localisation



#### Asset Tracking

- Floor conveyor systems
- Medical devices



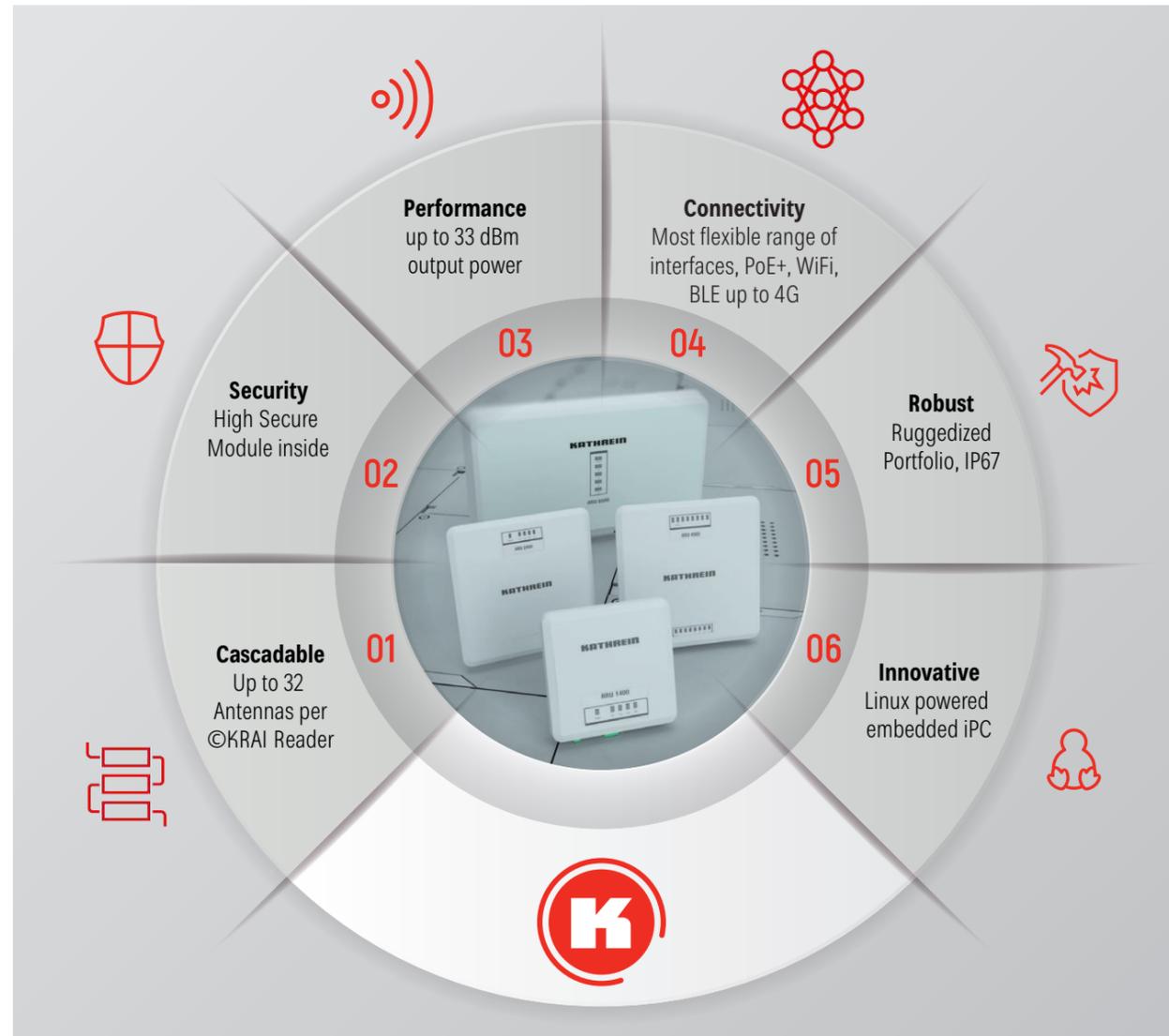
#### Customized Solutions

- Localization with e-bike tracker
- Based on Apple Find My network



#### Real-time localization

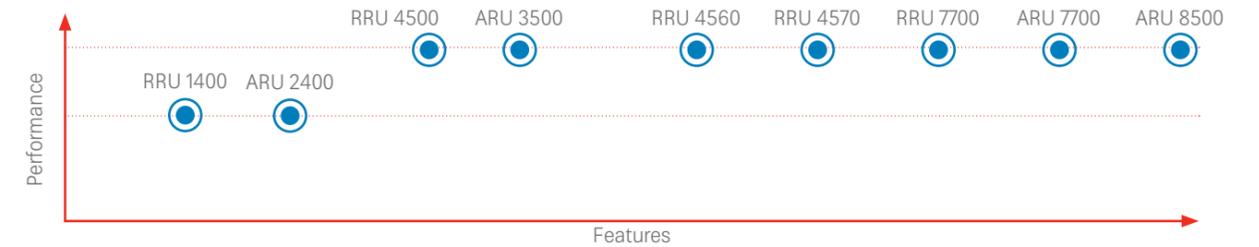
- Track & Trace
- Inventory management
- Security



## RAIN RFID readers

Kathrein Solutions passive UHF RFID readers, which meet ISO 18000-6C, impress with their first-class reading performance, flexibility, powerful Linux operating systems and IP protection classes suitable for a wide range of applications.

### > Reader overview and approvals



Reader	RRU 1400	RRU 4500			RRU 4560	RRU 4570	ARU 2400		ARU 3500	ARU 8500								
Order-No.	52010551	52010552	52010585	52010288	52010296	52010454	52010536	52010698	52010289	52010297	52010290	52010298	52010348	52010349	52010637	52010292	52010300	52010340
Country																		
Australia	CHEK								CHEK								CHEK	
Argentina					CHEK													
Brazil	CHEK				CHEK				CHEK			CHEK					CHEK	
Canada	CHEK				CHEK				CHEK			CHEK					CHEK	
China						CHEK												
EU 865 - 868 MHz	CHEK			CHEK					CHEK		CHEK		CHEK			CHEK		CHECK
EU 915 - 921 MHz	CHEK				CHEK				CHEK		CHEK		CHEK			CHEK		
Guatemala 902 - 906 MHz		CHEK			CHEK				CHEK			CHEK					CHEK	
Guatemala 918 - 923 MHz		CHEK			CHEK				CHEK			CHEK					CHEK	
India <sup>1)</sup> 865 - 867 MHz	CHEK			CHEK					CHEK		CHEK		CHEK			CHEK		CHECK
Indonesia		CHEK			CHEK				CHEK		CHEK		CHEK				CHEK	
Japan		CHEK			CHEK			CHEK	CHEK		CHEK		CHEK				CHEK	
Mexico		CHEK			CHEK				CHEK		CHEK		CHEK				CHEK	
Morocco	CHEK			CHEK					CHEK		CHEK		CHEK			CHEK		CHECK
Peru		CHEK			CHEK				CHEK		CHEK		CHEK				CHEK	
Russia <sup>2)</sup> 866 - 868 MHz	CHEK			CHEK					CHEK		CHEK		CHEK			CHEK		CHECK
Saudi Arabia	CHEK			CHEK					CHEK		CHEK		CHEK			CHEK		CHECK
Singapore			CHEK	CHEK		CHEK												
South Africa 865 - 868 MHz	CHEK			CHEK					CHEK		CHEK		CHEK			CHEK		
South Africa 915 - 919 MHz		CHEK			CHEK				CHEK		CHEK		CHEK				CHEK	
South Korea		CHEK			CHEK				CHEK		CHEK		CHEK				CHEK	
Thailand		CHEK			CHEK				CHEK		CHEK		CHEK				CHEK	
Turkey <sup>2)</sup>	CHEK			CHEK					CHEK		CHEK		CHEK			CHEK		CHECK
USA		CHEK			CHEK				CHEK		CHEK		CHEK			CHEK		
Vietnam		CHEK			CHEK				CHEK		CHEK		CHEK				CHEK	

CHEK Country profile and certification in place.  
 CHEK Country profile in place, certification pending.  
 1) Import via local dealer.  
 2) License from local company required.



**RAIN RFID Technology: Your Way to a Successful Future!**

Kathrein Solutions passive UHF RFID Reader Hardware includes stationary reader and antennas with a read range from a few centimetres up to several meters. With those high end devices logistics, industrial automation, healthcare and vehicle identification applications can be covered.

Kathrein Solutions Reader Portfolio							
Type	RRU 1400	ARU 2400	ARU 3500	RRU 4500	ARU 7700	RRU 7700	ARU 8500
Specifications	RAIN RFID / ISO 18000-63 and EPCglobal Gen2v2 compliant			RAIN RFID / ISO 18000-63 and EPCglobal Gen2v2 compliant			
Air interface protocol	RAIN RFID / ISO 18000-63 and EPCglobal Gen2v2 compliant						
Integrated antenna		1	1		1		3 (direction detection)
Ports for ext. antennas	4	3	3	4	3	4	3
Read zone with ©KRAI 1)	32	25	-	32	-	32	-
Transmit power [max. dBm]	+30	+30	+33	+33	+33	+33	+33
Sensitivity [dBm]	typ. -70	typ. -70	typ. -80				
Tag per-second	500	500	1000	1000	1000	1000	600
Processor speed	ARMv7-A based processor with 600 MHz			ARMv7-A based processor, 2 cores @ 800 MHz			
Flash memory eMMC [Mbyte]	4.000	4.000	8.000	8.000	8.000	8.000	8.000
RAM DDR2 [Mbyte]	128	128	1.000	1.000	1.000	1.000	1.000
Ethernet ports	1	1	2	2	2	2	2
GPIO - Input/output	2/2	2/2	4/4	4/4	4/4	4/4	4/4
LED visualisation	4	4	4 + 8	4 + 8	4 + 8	4 + 8	4
Degree of protection	IP40	IP40	IP67*	IP67*	IP67*	IP67*	IP40
Wireless interfaces				WiFi, BLE, 4G			
Key characteristics							
RFID performance	■ ■ ■ ■ ■ □ □	■ ■ ■ ■ □ □ □	■ ■ ■ ■ ■ □	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ □	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ □ □
Network & security	■ ■ ■ ■ ■ □ □	■ ■ ■ ■ ■ □ □	■ ■ ■ ■ ■ □ □	■ ■ ■ ■ ■ □	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ □ □
Connectivity	■ ■ ■ ■ □ □ □	■ ■ ■ ■ □ □ □	■ ■ ■ ■ ■ □ □	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ □ □	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ □ □
Use case							
Manufacturing and Automotive	CHECK	CHECK	CHECK	CHECK	CHECK	CHECK	
Logistics	CHECK	CHECK	CHECK	CHECK	CHECK	CHECK	CHECK
Track & Trace	CHECK	CHECK		CHECK		CHECK	CHECK
Intelligent Transportation Systems			CHECK	CHECK	CHECK	CHECK	
Healthcare	CHECK	CHECK		CHECK		CHECK	CHECK

1) with the suitable ©KRAI Kathrein antennas, the readers with ©KRAI function allow polarization switching and SMSH cascading

\* if all connections are made with a Kathrein cable or with Kathrein protective caps



## > RRU 1400 reader series

- 30 dBm/1 W conducted power
- Up to 33 dBm ERP/2 W ERP
- FAKRA antenna connections
- @KRAI
- IP40
- Small form factor
- Basic computer module



Name	RRU 1400
Order number of ETSI version	52010551
Order number of FCC version*	52010552
Basic computer module	check
Number of Ethernet connections	1
GPIO	check
PoE+	check
LED display	check
©KRAI	check

\* Suitable for application in the ETSI upper band range

### Accessoires

Order number	Description	Order number	Description
52010451	1 m RFID antenna cable, SMA-FAKRA	52010474	R-RPA 24VDC-18W, AC/DC power supply unit
52010452	3 m RFID antenna cable, SMA-FAKRA	52010485	0,5 m RFID antenna cable, FAKRA-FAKRA
52010453	5 m RFID antenna cable, SMA-FAKRA	52010486	1 m RFID antenna cable, FAKRA-FAKRA
52010461	1 m RFID antenna cable, TNC-FAKRA	52010487	3 m RFID antenna cable, FAKRA-FAKRA
52010462	3 m RFID antenna cable, TNC-FAKRA	52010488	5 m RFID antenna cable, FAKRA-FAKRA
52010463	5 m RFID antenna cable, TNC-FAKRA	52010261	Wall mount kit indoor

## > RRU 1400 reader overview

RFID UHF reader Üoverview	ETSI version	FCC version
	RRU 1400	RRU 1400
Frequency range [MHz]	865-868   915-921 (ETSI upper band)	902-928
Max. TX power, conducted [dBm]	+30	
Number of FAKRA antenna connections	4	
Operating system reader	Linux	
Basic computer module	ARMv7-A based processor with 600 MHz	
©KRAI	check	
Interface		
Number of Ethernet connections	1	
GPIO	check	
PoE+	PoE+ according to 802.3at (10-57)	
LED display, freely programmable		
Basic LEDs	4	
Mechanical properties		
Operating temperature range [°C]	-20 to +55	
Storage temperature range [°C]	-40 to +85	
Dimensions (L x W x H) [mm]	167 x 167 x 40	
Protection class	IP40	
Standards	EPC Gen2 V2, UCODE DNA FCC Part15, UL, IC, EN302208-2 V2.1.1, EN301489-3, EN50364, EN62368-1, EN60529	



### > ARU 2400 reader series

- 30 dBm/2 W conducted power
- Up to 33 dBm ERP/2 W ERP\*
- FAKRA antenna connections
- IP40
- PoE+
- @KRAI
- Basic computer module



Name	ARU 2400
Order number of ETSI version	52010348
Order number of FCC version**	52010349
Basic computer module	check
Number of Ethernet connections	1
GPIO	check
LED display	check
PoE	check
@KRAI	check

\* With external antennas \*\* Suitable for application in the ETSI upper band range

#### Accessoires

Name	Description	Name	Description
52010451	1 m RFID antenna cable, SMA-FAKRA	52010479	MK-SHM-4P tting kit for shelf assembly
52010452	3 m RFID antenna cable, SMA-FAKRA	52010485	0.5 m RFID antenna cable, FAKRA-FAKRA
52010453	5 m RFID antenna cable, SMA-FAKRA	52010486	1 m RFID antenna cable, FAKRA-FAKRA
52010461	1 m RFID antenna cable, TNC-FAKRA	52010487	3 m RFID antenna cable, FAKRA-FAKRA
52010462	3 m RFID antenna cable, TNC-FAKRA	52010488	5 m RFID antenna cable, FAKRA-FAKRA
52010463	5 m RFID antenna cable, TNC-FAKRA		
52010474	R-RPA 24VDC-18W, AC/DC power supply unit		
52010261	Wall mount kit indoor		

### > ARU 2400 reader overview

RFID UHF reader overview	ETSI version	FCC version
	ARU 2400	ARU 2400
Frequency range [MHz]	865-868	902-928   915-921 (ETSI upper band)
Max. TX power conducted [dBm]	+30	
Max. TX power radiated [dBm] int. antenna	+30,25	+32,5
Protocol	EPC Class1 Gen2V2/ISO 18000-6C	
Number of antenna connections	3, Fakra connector, Z-coded	
Operating system reader	Linux	
Basic computer module	ARMv7-A based processor with 600 MHz	
@KRAI	check	
Integration of the antenna		
Half-power beam width [°]	60	
Gain, circular [dBiC]	typ. 5.5	
Interface		
Ethernet	1	
PoE	PoE Class 0 according to 802.3at (10-57)	
GPIO	2 inputs, 2 outputs	
LED display, freely programmable	4 basic LEDs	
Mechanical properties		
Operating temperature range [°C]	-20 to +55	
Storage temperature range [°C]	-40 to +85	
Dimensions (L x W x H) [mm]	300 x 300 x 49	
Protection class	IP40	
Standards		
	EPC Gen2 V2, UCODE DNA	
	FCC Part15, UL, IC, EN302208-2 V2.1.1, EN301489-3, EN50364, EN62368-1, EN60529	



### > ARU 3500 reader series

- 33 dBm/2 W conducted power
- Up to 36 dBm ERP/4 W ERP\*
- Integrated 65° antenna
- Robust Design
- Protection class IP67
- Dual Core Linux PC
- PoE+



Name	ARU 3500
Order number of ETSI version	52010292
Order number of FCC version**	52010300
Integrated industrial PC with dual core CPU	check
Number of Ethernet connections	2
GPIO	check
LED display	check
PoE+	check

\* With external antennas \*\* Suitable for application in the ETSI upper band range

#### Accessoires

Order number	Description	Order number	Description
52010358	10 m RRU/ARU DC power cable	52010364	RRU/ARU AC/DC power supply unit 24 V/90 W
52010359	3 m RRU/ARU DC power cable	52010365	RRU/ARU AC/DC power supply unit 24 V/72 W DIN rail
52010360	10 m RRU/ARU Ethernet cable M12/RJ45	52010366	RRU/ARU AC/DC power supply unit 24 V/90 W DIN rail
52010361	3 m RRU/ARU Ethernet cable M12/RJ45	52010369	PoE+ Ethernet Switch, 4-port
52010362	10 m RRU/ARU GPIO cable M12	52010370	PoE+ injector 30 W, 100 Mbit for RRU, ARU
52010363	3 m RRU/ARU GPIO cable M12	52010351	Outdoor wall bracket
52010373	10 m RRU/ARU Ethernet connection cable	52010261	Indoor wall bracket
52010174	3 m low-loss 240 antenna cable	52010367	Vandalism protection for RRU, ARU
52010175	6 m low-loss 240 antenna cable	52010376	Protective caps for RRU 4xxx, ARU 3xxx
52010176	10 m low-loss 240 antenna cable TNC/TNCR		
52010177	15 m low-loss 240 antenna cable TNC/TNCR		

### > ARU 3500 reader overview

RFID UHF reader overview	ETSI version	FCC version
	ARU 3500	ARU 3500
Frequency range [MHz]	865-868	902-928   915-921 (ETSI upper band)
Max. TX power, conducted [dBm]	+33	+30 (+33 with extended cable length)
Max. TX power radiated [dBm] int. antenna	+33 ERP	+36 EIRP
Protocol	EPC Class1 Gen2/ISO 18000-6C	
Number of antenna connections [R-TNC]	3	
Operating system reader	Linux	
Integrated industrial PC	dual core @ 800 MHz/8 GB/Linux OS	
<b>Interfaces</b>		
Number of Ethernet connections	2	
PoE+	PoE+ according to 802.3at (10-57)	
GPIO	4 inputs/4 outputs	
<b>Integration of the antenna</b>		
Half-power beam width [°]	65°	
Antenna gain [dBiC]	8,5	
<b>LED display, freely programmable</b>		
Basic LEDs	4	
High-end LEDs	8	
<b>Mechanical properties</b>		
Operating temperature range [°C]	-20 to +55	
Storage temperature range [°C]	-40 to +85	
Dimensions (L x W x H) [mm]	300 x 300 x 71	
Protection class	IP67*	
<b>Standards</b>		
	EPC Gen2 V2, UCODE DNA	
	FCC Part15, UL, IC, EN302208-2 V2.1.1, EN301489-3, EN50364, EN62368-1, EN60529	

\* If all connections are made with a Kathrein cable or have Kathrein protective caps



## > RRU 4500 reader series

- 33 dBm/2 W conducted power
- Up to 36 dBm ERP/4 W ERP
- Robust design
- Protection class IP67
- Dual-core Linux PC
- PoE+
- ©KRAI
- 2G/3G/4G, WIFI, BLE optional



Name	RRU 4500	RRU 4560	RRU 4570
Order number of ETSI version	52010288	52010289	52010290
Order number of FCC version*	52010296	52010297	52010298
Integrated industrial PC with dual core CPU	check	check	check
Number of Ethernet connections	2	2	2
GPIO	check	check	check
©KRAI	check	check	check
PoE+	check	check	check
LED display	check	check	check
WLAN		check	
Bluetooth		check	
2G/3G/4G			check

\* Suitable for application in the ETSI upper band range

### Accessoires

Order number	Description	Order number	Description
52010358	10 m RRU/ARU DC power cable	52010364	RRU/ARU AC/DC power supply unit 24 V/90 W
52010359	3 m RRU/ARU DC power cable	52010365	RRU/ARU AC/DC power supply unit 24 V/72 W DIN rail
52010360	10 m RRU/ARU Ethernet cable M12/RJ45	52010366	RRU/ARU AC/DC power supply unit 24 V/90 W DIN rail
52010361	3 m RRU/ARU Ethernet cable M12/RJ45	52010369	PoE+ Ethernet switch, 4 connections
52010362	10 m RRU/ARU GPIO cable M12	52010370	PoE+ injector 30 W, 100 Mbit for RRU, ARU
52010363	3 m RRU/ARU GPIO cable M12	52010351	Outdoor wall bracket
52010373	10 m RRU/ARU Ethernet connection cable	52010261	Indoor wall bracket
52010174	3 m low-loss 240 antenna cable	52010367	Vandalism protection for RRU, ARU
52010175	6 m low-loss 240 antenna cable	52010376	Protective caps for RRU 4xxx, ARU 3xxx
52010176	10 m low-loss 240 antenna cable TNC/TNCR		
52010177	15 m low-loss 240 antenna cable TNC/TNCR		

## > RRU 4500 reader overview

RFID UHF reader overview	ETSI version	FCC version
	RRU 45xx	RRU 45xx
Frequency range [MHz]	865-868	902-928   915-921 (ETSI upper band)
Max. TX power, conducted [dBm]	+33	+30 (+33 with extended cable length)
Protocol	EPC Class1 Gen2/ISO 18000-6C	
Number of antenna connections [R-TNC]	4	
Operating system reader	Linux	
Basic computer module	check	check
Integrated industrial PC	dual core @ 800 MHz/8 GB/Linux OS	dual core @ 800 MHz/8 GB/Linux OS
©KRAI	check	check
Interfaces		
Number of Ethernet connections	2	2
WLAN	RRU 4560	RRU 4560
Bluetooth	RRU 4560	RRU 4560
2G/3G/4G	RRU 4570	RRU 4570
PoE+	PoE+ according to 802.3at (10-57)	
GPIO	4 inputs/4 outputs	
LED display, freely programmable		
Basic LEDs	4	
High-end LEDs	8	
Mechanical properties		
Operating temperature range [°C]	-20 to +55	
Storage temperature range [°C]	-40 to +85	
Dimensions (L x W x H) [mm]	300 x 300 x 71	
Protection class	IP67*	
Standards	EN302208-2 V2.1.1, EN301489-3, EN50364, EN62368-1, EN60529, EPC Gen2 V2, UCODE DNA	
	FCC Part15, UL, IC,	

\* If all connections are made with a Kathrein cable or have Kathrein protective caps



## > RRU 7700 reader series

- 33 dBm/2 W conducted power
- Up to 36 dBm ERP/4 W ERP
- Crypto suite conform
- Built-in high secure memory module
- Dual core Linux CPU
- PoE+; ©KRAI
- Robust design
- Protection class IP67



Name	RRU 7700
Order number of ETSI version	52010592
Order number of FCC version*	52010594
Integrated industrial PC with Dual Core CPU	check
Built-in high security memory (HSM) module	check
Crypto suite conform	check
Number of Ethernet connections	2
GPIO	check
©KRAI	check
PoE+	check
LED display	check

\* Suitable for application in the ETSI upper band range

### Accessoires

Order number	Description	Order number	Description
52010358	10 m RRU/ARU DC power cable	52010364	RRU/ARU AC/DC power supply unit 24 V/90 W
52010359	3 m RRU/ARU DC power cable	52010365	RRU/ARU AC/DC power supply unit 24 V/72 W DIN rail
52010360	10 m RRU/ARU Ethernet cable M12/RJ45	52010366	RRU/ARU AC/DC power supply unit 24 V/90 W DIN rail
52010361	3 m RRU/ARU Ethernet cable M12/RJ45	52010369	PoE+ Ethernet Switch, 4-port
52010362	10 m RRU/ARU GPIO cable M12	52010370	PoE+ injector 30 W, 100 Mbit for RRU, ARU
52010363	3 m RRU/ARU GPIO cable M12	52010351	Outdoor wall bracket
52010373	10 m RRU/ARU Ethernet connection cable	52010261	Indoor wall bracket
52010174	3 m low-loss 240 antenna cable TNC/TNCR	52010367	Vandalism protection for RRU, ARU
52010175	6 m low-loss 240 antenna cable TNC/TNCR	52010376	Protective caps for RRU 4xxx, ARU 3xxx
52010176	10 m low-loss 240 antenna cable TNC/TNCR		
52010177	15 m low-loss 240 antenna cable TNC/TNCR		

## > RRU 7700 reader overview

RFID UHF reader overview	ETSI version	FCC version
	RRU 7700	RRU 7700
Frequency range [MHz]	865-868	902-928   915-921 (ETSI upper band)
Max. TX power, conducted [dBm]	+33	+30 (+33 with extended cable length)
Protocol	EPC Class1 Gen2/ISO 18000-6C	
Number of antenna connections [R-TNC]	4	
Operating system reader	Linux	
Basic computer module	check	
Integrated industrial PC	dual-core @ 800 MHz/8 GB/Linux OS	
@KRAI	check	
Interfaces		
Number of Ethernet connections	2	
PoE+	PoE+ according to 802.3at (10-57)	
GPIO	4 inputs/4 outputs	
LED display, freely programmable		
Basic LEDs	4	
High-end LEDs	8	
Mechanical properties		
Operating temperature range [°C]	-20 to + 55	
Storage temperature range [°C]	-40 to + 85	
Dimensions (L x W x H) [mm]	300 x 300 x 71	
Protection class	IP67*	
Standards		
Crypto standards	ISO/IEC 29167-10 ISO/IEC 18046-2 ISO/IEC 18047-6	
Standards for the HF interface	EPC Gen2 V2, UCODE DNA FCC Part15, UL, IC, EN302208-2 V2.1.1, EN301489-3, EN50364, EN62368-1, EN60529	

\* If all connections are made with a Kathrein cable or have Kathrein protective caps



## ➤ ARU 7700 reader series

- 33 dBm/2 W conducted power
- Up to 36 dBm ERP/4 W ERP\*
- Crypto suite conform
- Integrated 65° antenna
- Dual core Linux CPU
- PoE+
- Robust design
- Protection class IP67



Name	ARU 7700
Order number of ETSI version	52010593
Order number of FCC version*	52010595
Integrated industrial PC with dual core CPU	check
Built-in high security memory (HSM) module	check
Crypto suite conform	check
Number of Ethernet connections	2
GPIO	check
PoE+	check
LED display	check

\* Suitable for application in the ETSI upper band range

### Accessoires

Order number	Description	Order number	Description
52010358	10 m RRU/ARU DC power cable	52010364	RRU/ARU AC/DC power supply unit 24 V/90 W
52010359	3 m RRU/ARU DC power cable	52010365	RRU/ARU AC/DC power supply unit 24 V/72 W DIN rail
52010360	10 m RRU/ARU Ethernet cable M12/RJ45	52010366	RRU/ARU AC/DC power supply unit 24 V/90 W DIN rail
52010361	3 m RRU/ARU Ethernet cable M12/RJ45	52010369	PoE+ Ethernet switch, 4-port
52010362	10 m RRU/ARU GPIO cable M12	52010370	PoE+ injector 30 W, 100 Mbit for RRU, ARU
52010363	3 m RRU/ARU GPIO cable M12	52010351	Outdoor wall bracket
52010373	10 m RRU/ARU Ethernet connection cable	52010261	Indoor wall bracket
52010174	3 m low-loss 240 antenna cable TNC/TNCR	52010367	Vandalism protection for RRU, ARU
52010175	6 m low-loss 240 antenna cable TNC/TNCR	52010376	Protective caps for RRU 4xxx, ARU 3xxx
52010176	10 m low-loss 240 antenna cable TNC/TNCR		
52010177	15 m low-loss 240 antenna cable TNC/TNCR		

## ➤ ARU 7700 reader overview

RFID UHF reader overview	ETSI version	FCC version
	ARU 7700	ARU 7700
Frequency range [MHz]	865-868	902-928   915-921 (ETSI upper band)
Max. TX power conducted [dBm]	+33	+30 (+33 with extended cable length)
Protocol	EPC Class1 Gen2/ISO 18000-6C	
Number of antenna connections [R-TNC]	3	
Operating system reader	Linux	
Basic computer module	check	
Integrated industrial PC	dual core @ 800 MHz/8 GB/Linux OS	
Interfaces		
Number of Ethernet connections	2	
PoE+	PoE+ according to 802.3at (10-57)	
GPIO	4 inputs/4 outputs	
Integration of the antenna		
Half-power beam width [°]	65	
Antenna gain [dBiC]	8.5	
LED display, freely programmable		
Basic LEDs	4	
High-end LEDs	8	
Mechanical properties		
Operating temperature range [°C]	-20 to + 55	
Storage temperature range [°C]	-40 to + 85	
Dimensions (L x W x H) [mm]	300 x 300 x 71	
Protection class	IP67*	
Standards		
Crypto standards	ISO/IEC 29167-10 ISO/IEC 18046-2 ISO/IEC 18047-6	
Standards for the HF interface	EPC Gen2 V2, UCODE DNA FCC Part15, UL, IC, EN302208-2 V2.1.1, EN301489-3, EN50364, EN62368-1, EN60529	

\* If all connections are made with a Kathrein cable or have Kathrein protective caps



## ➤ ARU 8500 reader series

- 33 dBm/2 W conducted power
- Direction recognition by integrated switch-beam antenna
- Up to 36 dBm ERP/4 W ERP\*
- IP40
- Dual core Linux PC
- 3 other external antenna connectors



Name	ARU 8500
Order number of ETSI version	52010340
Order number of FCC version**	52010341
Integrated industrial PC with dual core CPU	check
Number of Ethernet connections	2
GPIO	check
LED display	check
PoE+	check
Antenna system	Phased array antennas with 3 reading zones

\* For external antennas \*\* Suitable for application in the ETSI upper band range

### Accessoires

Order number	Description	Order number	Description
52010358	10 m RRU/ARU DC power cable	52010364	RRU/ARU AC/DC power supply unit 24 V/90 W
52010359	3 m RRU/ARU DC power cable	52010365	RRU/ARU AC/DC power supply unit 24 V/72 W DIN rail
52010360	10 m RRU/ARU Ethernet cable M12/RJ45	52010366	RRU/ARU AC/DC power supply unit 24 V/90 W DIN rail
52010361	3 m RRU/ARU Ethernet cable M12/RJ45	52010369	PoE+ Ethernet switch, 4-port
52010362	10 m RRU/ARU GPIO cable M12	52010370	PoE+ injector 30 W, 100 Mbit for RRU, ARU
52010363	3 m RRU/ARU GPIO cable M12	52010351	Outdoor wall bracket
52010373	10 m RRU/ARU Ethernet bridge cable	52010261	Indoor wall bracket
52010174	3 m low-loss 240 antenna cable	52010367	Vandalism protection for RRU, ARU, WRA 70
52010175	6 m low-loss 240 antenna cable	52010376	Protective caps for RRU, ARU
52010176	10 m low-loss 240 antenna cable TNC/TNCR		
52010177	15 m low-loss 240 antenna cable TNC/TNCR		

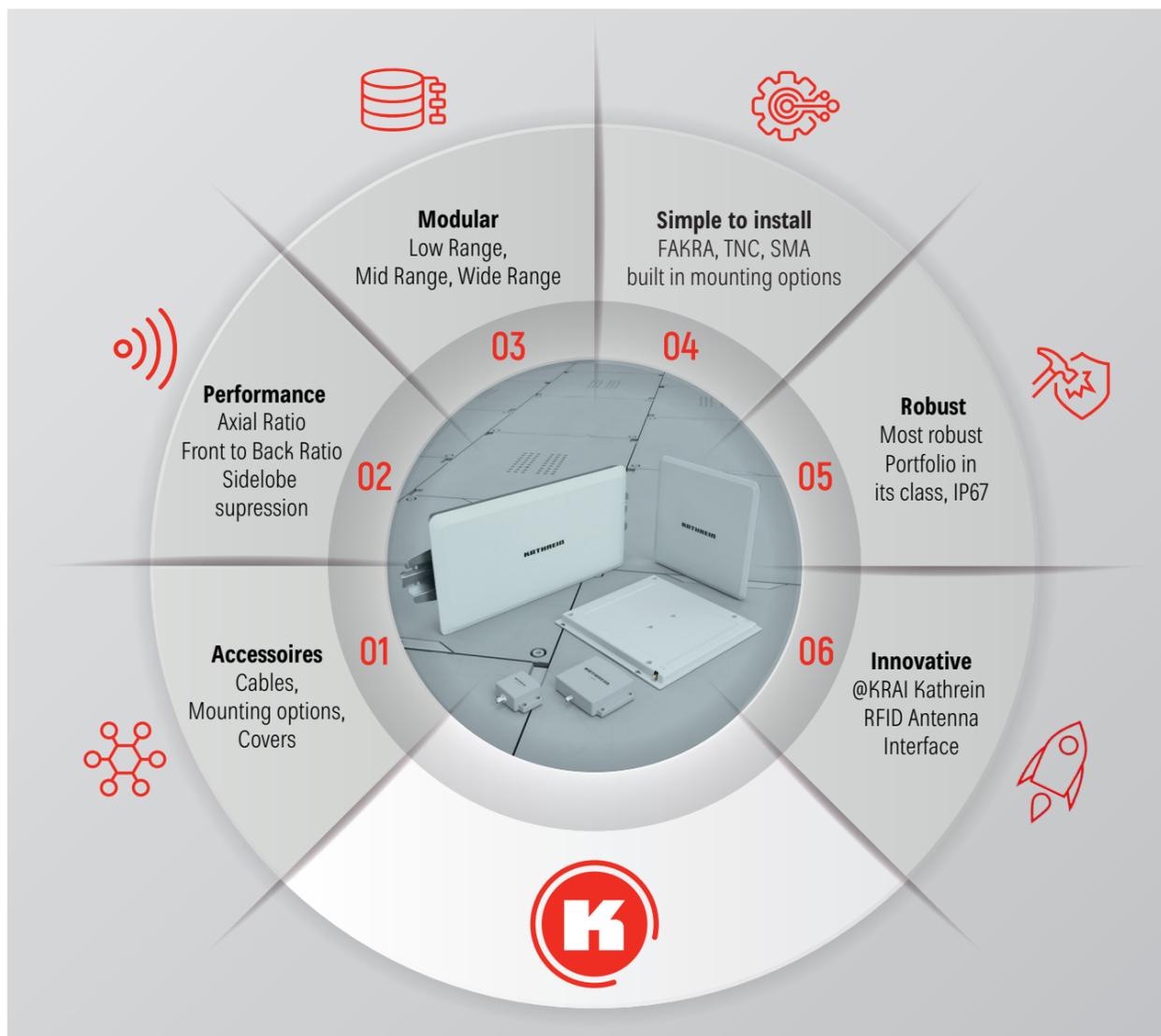
## ➤ ARU 8500 reader overview

Frost & Sullivan awarded Kathreins ARU8500 with the 2020 Best Practices Award for the “European RFID Reader in Manufacturing and Logistics New Products Innovation”.

With its 30° antenna and dynamic reading zones, the ARU8500 reader facilitates direction detection of

moving goods. 3 additional antenna connectors mean that it offers the highest precision even in industrial environments. It is therefore the perfect solution for incoming and outgoing goods, anti-theft monitoring in retail, asset tracking and many other logistics applications.

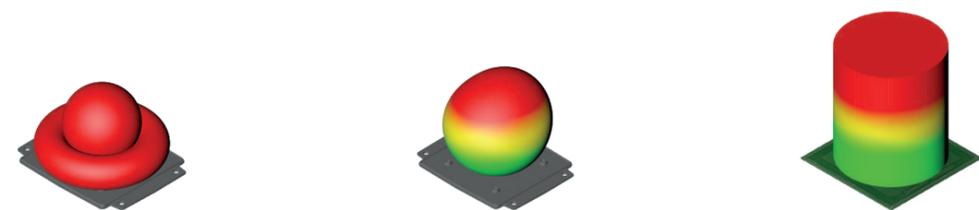
RFID UHF reader overview	ETSI version	FCC version
	ARU 8500	ARU 8500
Frequency range [MHz]	865-868	902-928   915-921 (ETSI upper band)
Max. TX power radiated [dBm]	+33	+30 (+33 with extended Kabel length)
Max. TX power radiated [dBm] int. antenna	+33 ERP	+36 EIRP
Protocol	EPC Class1 Gen2/ISO 18000-6C	
Number of antenna connections	6 (3 = left/middle/right + 3 ext. R-TNC)	
Operating system reader	Linux	
Basic computer module	check	
Integrated industrial PC	dual core @ 800 MHz/8 GB/Linux OS	
Integration of the antenna		
Half-power beam width [°]	30 vertical/80 horizontal	
Gain left / middle / right [dBiC]	7.0/8.0/7.0	
Deflection of the detection areas	+35/0/-35	
Polarization	circular	
Interface		
Ethernet	2	
PoE+	PoE+ according to 802.3at (10–57)	
GPIO	4 inputs/4 outputs	
LED display, freely programmable	4 basic LEDs	
Mechanical properties		
Operating temperature range [°C]	-20 to +55	
Storage temperature range [°C]	-40 to +85	
Dimensions (L x W x H) [mm]	656 x 362 x 112	
Protection class	IP40	
Standards		
	EPC Gen2 V2, UCODE DNA	
	FCC Part15, UL, IC, EN302208-2 V2.1.1, EN301489-3, EN50364, EN62368-1, EN60529	



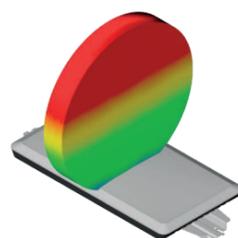
## RAIN RFID antennas

Kathrein Solutions passive UHF-RFID antennas impress with their high performance even under the harshest conditions. Suitable for a wide range of applications thanks to read ranges from a few centimeters up to 20 meters, our portfolio always has the right component. Special properties such as ©KRAI (Kathrein RFID Antenna Interface) also facilitate various intelligent functions, such as polarization switching and antenna cascading.

### > Antenna overview



	Near-Field	Low-Gain	Mid-Gain
	U-LORA / LORA	S-MIRA / MIRA	Smart-Shelf HG / WRA 6060
Gain	-30 dBiC / -15 dBiC	-12 dBiC / 2.5 dBiC	4.5 dBiC / 4.5 dBiC
Beamwidth	-	100°/100° / 100°/100°	60°/60° / 60°/60°
Read Range	< 0,1 m / < 0,1 m	0 - 1 m / 0 - 2 m	0 - 5 m / 0 - 5 m
Applications	Access Control Automation Medical Cabinets Proximity Readpoints Payment Readpoints	Asset Tracking Material Handling Point of Sales Kanban Shelves Smart Shelves Conveyor Belts	Asset Tracking Material Handling Point of Sales Kanban Shelves Smart Shelves Conveyor Belts



High-Gain	High-Gain	High-Gain
WRA 7070 / WRA 7070 KRAI	WIRA 40	WRA 3070
Gain		
8.5 dBiC / 6.5 dBiC	12.5 dBiC	11.5 dBiC
Beamwidth		
60°/65° / 65°/65°	40°/40°	30°/65°
Read Range		
0 - 10 m / 0 - 10 m	> 10 m	> 10 m
Applications		
Gate Applications	Tolling Plaza	Tolling Multi-Lane Free-Flow
Production Lines	Vehicle Access	Dock-Door Gates
Parking Gates	Border Control	Border Control
Train Identification	Container Identification	Container Identification
Asset Tracking	Train Identification	Retail Tunnel
People Security Gates		Airport Luggage

### > Low-Range antenna overview

- Extremely high selectivity
- Reading range 20 cm
- Minimal form factor
- Protection class IP67
- Ideal for near-field applications
- Ideal for applications in the industrial environment



Order number	ETSI version	FCC version	Global version
	52010084	52010085	52010092
Name	LORA-ETSI	LORA-FCC	U-LORA-ETSI-FCC
Frequency range [MHz]	865-868	902-928	865-928
Range of near-field tags [cm]	typ. 7 @ NF-Tags		typ. 3 @ NF-Tags
Selectivity of near-field tags [cm]	typ. 5 @ NF-Tags		typ. 3 @ NF-Tags
Range of far-field tags [cm]	-	-	typ. 8 @ FF-Tags
Selectivity of far-field tags [cm]	-	-	typ. 10 @ FF-Tags
EIFF [dB]	20		15
Antenna gain [dBiC]	-15		-30
VSWR	< 1.3:1	< 1.8:1	< 1.2:1
Connection	TNC female		
Operating temperature range [°C]	-20 to +55		
Storage temperature range [°C]	-40 to +85		
Protection class	IP67*		
Dimensions (L x W x H) [mm]	79.5 x 90 x 31		

\* When connected with the Kathrein antenna cable

#### Accessoires

Order number	Description
52010694	1.5 m low-loss 240 antenna cable TNC/TNCR
52010174	3 m low-loss 240 antenna cable TNC/TNCR
52010175	6 m low-loss 240 antenna cable TNC/TNCR
52010176	10 m low-loss 240 antenna cable TNC/TNCR
52010177	15 m low-loss 240 antenna cable TNC/TNCR



### > Mid-Range antenna overview

- Compact, slim design
- Protection class IP67
- Read range up to 2 m
- Suitable for group and individual readings
- Ideal for applications in the industrial environment



Order number	ETSI version	FCC version	Global version
	52010082	52010083	52010172
Name	MIRA-100-circular-ETSI	MIRA-100-circular-FCC	S-MIRA-100-circular-ETSI-FCC
Frequency range [MHz]	865-868	902-928	865-928
Half-power beam width [°]	100		
Reading range [m]	typ. 0.2-2		typ. 0.1-1
Polarization	circular, LHCP*		circular, RHCP***
Antenna gain [dBiC]	2.5 (@ 866 MHz)	2.5 (@ 915 MHz)	-12 (@ 866 MHz) -10 (@ 915 MHz)
Axial ratio [dB]	typ. 1.5		typ. 2.0
VSWR	typ. 1.3:1		typ. 1.4:1
Connection	TNC female		
Operating temperature range [°C]	-20 to +55		
Storage temperature range [°C]	-40 to +85		
Protection class	IP67**		
Dimensions (L x W x H) [mm]	126.3 x 156 x 36		

\* Left-hand circular polarization \*\* When connected with the Kathrein antenna cable \*\*\* Right-hand circular polarization

#### Accessoires

Order number	Description
52010694	1.5 m low-loss 240 antenna cable TNC/TNCR
52010174	3 m low-loss 240 antenna cable TNC/TNCR
52010175	6 m low-loss 240 Aantenna cableTNC/TNCR
52010176	10 m low-loss 240 antenna cable TNC/TNCR
52010177	15 m low-loss 240 antenna cable TNC/TNCR
52010351	Outdoor wall bracket

### > SmartShelf antenna overview

- Super-slim design
- Read range up to 3 m
- Homogeneous, selective reading field with symmetrical pattern
- Robust and vibration-resistant
- Cascadable with up to 32 antennas using ©KRAI
- Suitable for e-KanBan and logistics applications



Order number	ETSI version		FCC version	
	52010523	52010524	52010525	52010526
Name	SMSH antenna	SMSH ©KRAI antenna	SMSH antenna	SMSH ©KRAI antenna
Frequency range [MHz]	865-868		902-928	
©KRAI	-	cascading	-	cascading
Protective cover	check			
Reading range [m]	0-3			
Polarization	circular, RHCP*			
Antenna gain [dBiC]	typ. 4.5		typ. 5	
Axial ratio [dB]	typ. 2			
VSWR	typ. 1.3:1			
Connection	FAKRA			
Operating temperature range [°C]	-20 to +55			
Storage temperature range [°C]	-40 to +85			
Protection class	Indoor			
Dimensions (L x W x H) [mm]	340 x 330 x 20			

\* Right-hand circular polarization

#### Accessoires

Order number	Description	Order number	Description
52010485	0.5 m RFID antenna cable, FAKRA-FAKRA	52010451	1 m RFID antenna cable, SMA-FAKRA
52010486	1 m RFID antenna cable, FAKRA-FAKRA	52010452	3 m RFID antenna cable, SMA-FAKRA
52010487	3 m RFID antenna cable, FAKRA-FAKRA	52010453	5 m RFID antenna cable, SMA-FAKRA
52010488	5 m RFID antenna cable, FAKRA-FAKRA	52010398	Backplane
52010527	1 m RFID antenna cable, FAKRA-TNC-R		
52010528	3 m RFID antenna cable, FAKRA-TNC-R		
52010529	5 m RFID antenna cable, FAKRA-TNC-R		



## > Wide-Range 6060 antenna overview

- Compact design
- Protection class IP67
- Read range up to 5 m
- Homogeneous, selective reading field with symmetrical pattern
- Very high front/back ratio
- For applications in the radiated near field and for identification of static transponders



Order number	ETSI version	FCC version
	52010423	52010424
Name	WRA 6060 antenna unit	WRA 6060 antenna unit
Frequency range [MHz]	865-868	902-928
Half-power beam width [°]	60/60	
Polarization	circular, RHCP*	
Antenna gain [dBiC]	typ. 5.5 (at 866 MHz)	typ. 5.5 (at 915 MHz)
Axial ratio	typ. 1	
VSWR	typ. 1.2:1	
Connection	TNC female	
Operating temperature range [°C]	-40 to +70	
Storage temperature range [°C]	-40 to +85	
Protection class	IP67**	
Dimensions (L x W x H) [mm]	300 x 300 x 49	

\* Right-hand circular polarization \*\* When connected with the Kathrein antenna cable

### Accessoires

Order number	Description
52010694	1.5 m low-loss 240 antenna cable TNC/TNCR
52010174	3 m low-loss 240 antenna cable TNC/TNCR
52010175	6 m low-loss 240 antenna cable TNC/TNCR
52010176	10 m low-loss 240 antenna cable TNC/TNCR
52010177	15 m low-loss 240 antenna cable TNC/TNCR
52010351	Outdoor wall bracket
52010261	Indoor wall bracket
52010479	Shelf fitting kit for ARU 2400 Reader, WRA 6060, WRA 7070

## > Wide-Range 7070 antenna overview

- Compact design
- Protection class IP67
- Read range up to 12 m
- Homogeneous reading field with symmetrical pattern
- ©KRAI interface for switching polarization (LHCP, RHCP, lin. hor., lin. ver.)
- Ideal for logistics applications and for recording vehicles



Order number	ETSI version		FCC version	
	52010333	52010335	52010334	52010336
Name	WRA 7070 antenna unit	WRA 7070 ©KRAI antenna unit	WRA 7070 antenna unit	WRA 7070 ©KRAI antenna unit
Frequency range [MHz]	865-868		902-928	
©KRAI	–	check	–	check
LED display, freely programmable	–	4 high-end LED	–	4 high-end LED
Half-power beam width [°]	65/65			
Circular polarization	RHCP**	LHCP/RHCP*	RHCP**	LHCP/RHCP*
Antenna gain circular [dBiC]	typ. 8.5 (at 866 MHz)	typ. 6.5	typ. 8.5 (at 915 MHz)	typ. 6.5
Axial ratio	typ. 1	typ. 2	typ. 1	typ. 2
Linear polarization	–	horizontal/vertical	–	horizontal/vertical
Antenna gain linear [dBi]	–	7.0	–	7.0
VSWR	typ. 1.2:1	typ. 1.4:1	typ. 1.2:1	typ. 1.8:1
Connection	TNC female			
Operating temperature range [°C]	-40 to +70			
Storage temperature range [°C]	-40 to +85			
Protection class	IP67***			
Dimensions (L x W x H) [mm]	300 x 300 x 49			

\* Left-hand/right-hand circular polarization \*\* Right-hand circular polarization \*\*\* When connected with the Kathrein antenna cable

### Accessoires

Order number	Description	Order number	Description
52010694	1.5 m low-loss 240 antenna cable TNC/TNCR	52010261	Indoor wall bracket
52010174	3 m low-loss 240 antenna cable	52010351	Outdoor wall bracket
52010175	6 m low-loss 240 antenna cable	52010479	Shelf fitting kit for ARU 2400 Reader, WRA 6060, WRA 7070
52010176	10 m low-loss 240 antenna cable TNC/TNCR		
52010177	15 m low-loss 240 antenna cable TNC/TNCR		



### > Wide-Range 40 antenna overview

- Compact design for robust outdoor applications
- Linear polarization for optimum reception of weak transponders
- Prepared for 3D mounting kit (52010262)
- Reading range up to 20 m
- Ideal solution for vehicle identification



Order number	ETSI Version	FCC Version
	52010251	52010252
Name	WiRa 40 antenna	WiRa 40 antenna
Frequency range [MHz]	865-868	902-928
Half-power beam width [°]	40/40	
Polarisation	linear	
Antenna gain [dBi]	typ. 12.5	typ. 13
VSWR	typ. 1.3 : 1	
Connector	N-socket	
Operating temperature range [°C]	-40 to 70	
Storage temperature range [°C]	-40 to 85	
Protection class	IP67	
Dimensions (L x B x H) [mm]	480 x 480 x 45.5	

#### Accessoires

Order number	Description
52010694	1.5 m low-loss 240 antenna cable TNC/TNCR
52010174	3 m low-loss 240 antenna cable TNC/TNCR
52010175	6 m low-loss 240 antenna cable TNC/TNCR
52010176	10 m low-loss 240 antenna cable TNC/TNCR
52010177	15 m low-loss 240 antenna cable TNC/TNCR
52010250	15 m low-loss antenna cablw N/TNCR
52010178	Antenna adapter N to TNC
52010262	Outdoor wall bracket

### > Wide-Range 3070 antenna overview

- Compact design
- Read range up to 20 m
- Excellent axial ratio
- Mounting kit for pole mount or gantry mount included
- Ideal for portal applications and vehicle identification

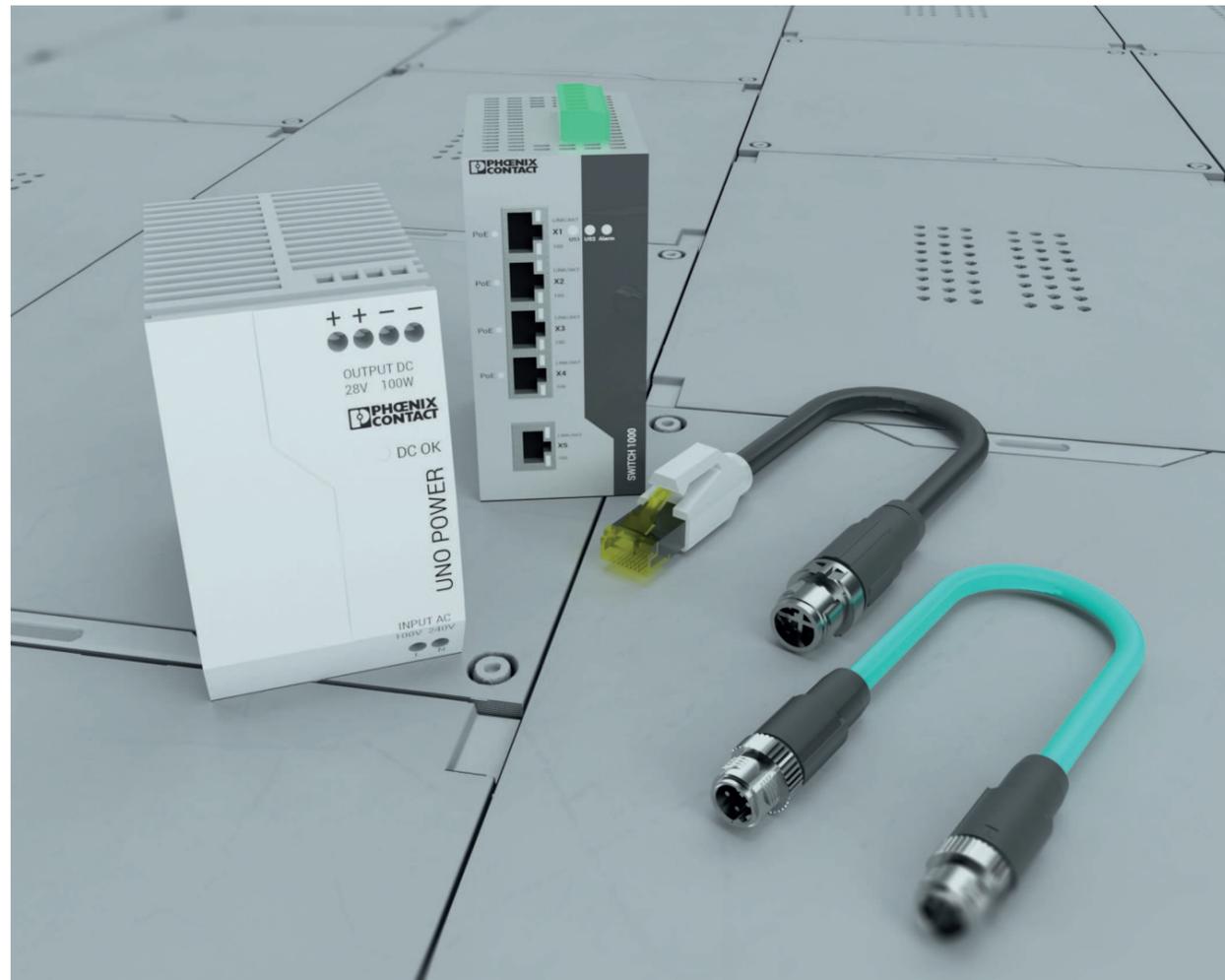


Order number	ETSI version	FCC version
	52010583	52010584
Name	WRA 3070 antenna unit ETSI	WRA 3070 antenna unit FCC
Frequency range [MHz]	865-868	902-928
Half-power beam width [°]	30/65	
Polarization	circular	
Antenna gain [dBiC]	typ. 12	typ. 11,5
VSWR	< 1.2:1	
Connector	TNC	
Operating temperature range [°C]	-40 to +70	
Storage temperature range [°C]	-40 to +85	
Protection class	IP67*	
Dimensions (L x W x H) [mm]	610 x 320 x 95	

\* When connected with the Kathrein antenna cable

#### Accessoires

Order number	Description
52010694	1.5 m low-loss 240 antenna cable TNC/TNCR
52010174	3 m low-loss 240 antenna cable TNC/TNCR
52010175	6 m low-loss 240 antenna cable TNC/TNCR
52010176	10 m low-loss 240 antenna cable TNC/TNCR
52010177	15 m low-loss 240 antenna cable TNC/TNCR
52010598	RR-AA TNC-TNC adaptor, right angle plug
52010351	Outdoor wall bracket



## RFID accessoires

Power supply, data and I/O connection and assembly accessories for Kathrein Solutions RFID readers and antennas.

### > Power supply

Order number	Name	Description
<b>For all readers</b>		
52010365	R-RPA 24VDC-72 W	RRU/ARU AC/DC power supply unit 24 V/72 W
52010366	R-RPA 24VDC-90 W	RRU/ARU AC/DC power supply unit 24 V/90 W
52020369	R-ETH-SW-100	PoE+ Ethernet switch, 4-port
52010370	R-POE-INJ-30	PoE+ injektor, 30 W, 100 Mbit für RRU und ARU
<b>For RRU 4000, RRU 7700, ARU 3000, ARU 7700, ARU 8500</b>		
52010364	R-RPA3 24VDC-90 W	RRU/ARU AC/DC POWER SUPPLY UNIT 24 V/90 W
<b>For RRU 4000, RRU 7700, ARU 3000, ARU 7700, ARU 8500</b>		
52010474	R-PRA 24DC-18W	AC/DC power supply unit 24 V/18 W, AC 110–230 V, mains plug device, replaceable AC plug



52010365



52010366



52010369



52010370



52010364



52010474

### > Reader connection cable for RRU 4000, ARU 3000, ARU 8500

Order number	Name	Length	Description
52010358	R-CC3-10-DC	10 m	RRU/ARU DC power cable
52010359	R-CC3-03-DC	3 m	RRU/ARU DC power cable
52010360	R-CC3 10 ETH	10 m	RRU/ARU Ethernet cable M12/RJ45
52010361	R-CC3-03-ETH	3 m	RRU/ARU Ethernet cable M12/RJ45
52010362	R-CC3 10 GPIO	10 m	RRU/ARU GPIO cable M12
52010363	R-CC3-03-GPIO	3 m	RRU/ARU GPIO cable M12
52010373	R-BC3-10-ETH	10 m	RRU/ARU Ethernet bridge cable
52010431	R-AC3 GPIO	0.5 m	RRU/ARU adapter cable GPIO, IP65, M12 male 12-pole, A-coded, 2x M12 female 8-pole, A-coded
52010432	R-AC3 ETH	0.5 m	RRU/ARU adapter cable Ethernet, IP65, M12 female 4-pole, D-coded, M12 male 8-pole, X-coded
52010376	PCS-G3-IP67		Protective cap set for RRU 4000, ARU 3000, IP67



52010358/359



52010360/361



52010362/363



52010373



52010431



52010376



> **Antenna cables**

Order number	Name	Description
<b>For RRU 4000, ARU 8500, ARU 3000</b>		
52010694	R-AC 1.5 TNC-TNCR	LL 240 flex, L = 1.5 m, IP65 robust design
52010174	R-AC 3 TNC-TNCR	LL 240 flex, L = 3 m, IP65 robust design
52010175	R-AC 6 TNC-TNCR	LL 240 flex, L = 6 m, IP65 robust design
52010176	R-AC 10 TNC-TNCR	LL 240 flex, L = 10 m, IP65 robust design
52010177	R-AC 15 TNC-TNCR	LL 240 flex, L = 15 m, IP65 robust design
52010598	R-AA TNC-TNC	TNV socket (f) to TNC plug (m), right angle plug
52010527	R-AC 1 FAKRA-TNCR	RFID antenna cable, L=1 m, IP40, FAKRA Z-coded to TNCR
52010528	R-AC 3 FAKRA-TNCR	RFID antenna cable, L=3 m, IP40, FAKRA Z-coded to TNCR
52010529	R-AC 5 FAKRA-TNCR	RFID antenna cable, L=5 m, IP40, FAKRA Z-coded to TNCR
<b>For ARU 2400 and RRU 1400</b>		
52010485	R-AC 0.5 FAKRA-FAKRA	RFID antenna cable, L=0.5 m, IP40, FAKRA Z-coded to FAKRA Z-coded
52010486	R-AC 1 FAKRA-FAKRA	RFID antenna cable, L=1 m, IP40, FAKRA Z-coded to FAKRA Z-coded
52010487	R-AC 3 FAKRA-FAKRA	RFID antenna cable, L=3 m, IP40, FAKRA Z-coded to FAKRA Z-coded
52010488	R-AC 5 FAKRA-FAKRA	RFID antenna cable, L=5 m, IP40, FAKRA Z-coded to FAKRA Z-coded
52010451	R-AC 1 SMA-FAKRA	RFID antenna cable, L=1 m, IP40; FAKRA Z-coded to SMA (m); right angle antenna plug
52010452	R-AC 3 SMA-FAKRA	RFID antenna cable, L=3 m, IP40; FAKRA Z-coded to SMA (m); right angle antenna plug
52010453	R-AC 5 SMA-FAKRA	RFID antenna cable, L=5 m, IP40; FAKRA Z-coded to SMA (m); right angle antenna plug
52010461	R-AC 1 TNC-FAKRA	RFID antenna cable, L=1 m, IP40; FAKRA Z-coded to TNC (m); right angle antenna plug
52010462	R-AC 3 TNC-FAKRA	RFID antenna cable, L=3 m, IP40; FAKRA Z-coded to TNC (m); right angle antenna plug
52010463	R-AC 5 TNC-FAKRA	RFID antenna cable, L=5 m, IP40; FAKRA Z-coded to TNC (m); right angle antenna plug
<b>For antennas with TNC connection</b>		
52010598	R-AA TNC- TNC adapter	90° TNC to TNC angle adapter



52010174



52010250



52010598



52010527/528/529



52010461/462/463



52010451/452/453



52010485/486/487/488

> **Connection box**

Order number	Name	Description
52010539	CB-A2	Advanced connection box; IP66, 230 V power supply unit, Ethernet, GPIO, AC breaker
52010540	CB-B2	Basic connection box, IP66, 230 V power supply unit, AC breaker
52010662	MK-CB-A2	Montage Kit for CB-A2 Connection Box Advanced
52010663	MK-CB-B2	Montage Kit for CB-B2 Connection Box Basic



52010540



52010539



52010662



52010663

> **SMSH aluminum back wall**

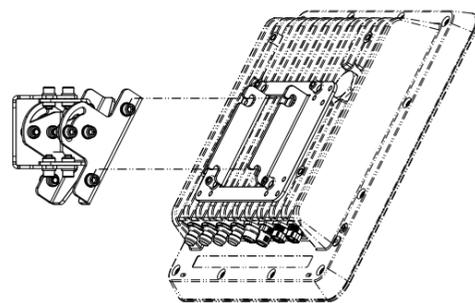
Order number	Name	Description
52010398	SMSH-BP-ALU	Aluminum back wall for SMSH



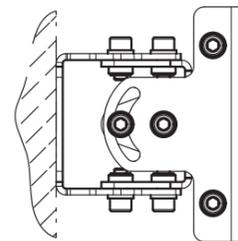


**> Outdoor wall/pole mounting kit for RAIN RFID hardware**

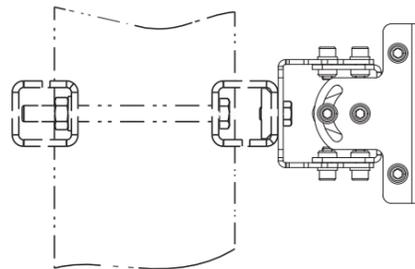
Order number	Name	Description
52010351	MK-WPM3-OSS Outdoor	Outdoor wall bracket
52010368	MK-PMA-OGV	Pole fitting extension for 52010351



52010351



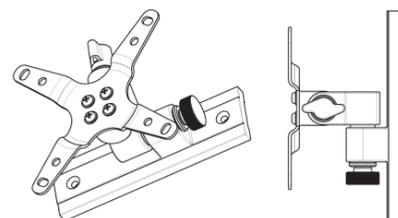
52010351/wall



52010368/Pole mount adapter for 52010351

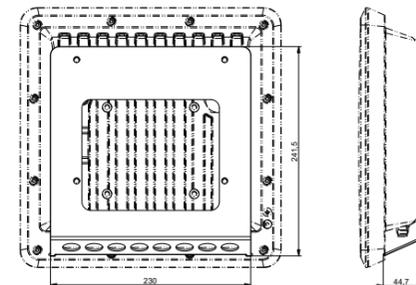
**> Indoor wall mounting kit for RAIN RFID hardware**

Order number	Name	Description
52010261	MK-WM-100-100-Indoor	Indoor wall bracket



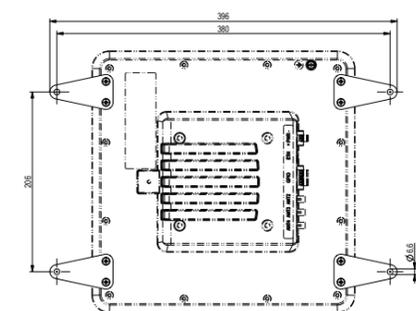
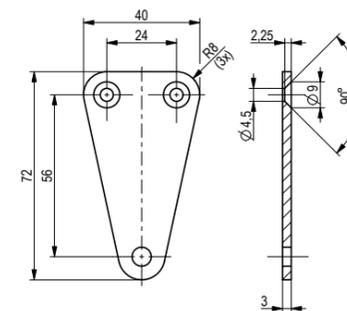
**> Vandalism protection for RRU 4000, ARU 3000, ARU 8500**

Order number	Name	Description
52010367	R-RVP3-VPP-SS	Vandalism protection for RRU 4000, ARU 3000



**> Shelf fitting kit for ARU 2400 Reader, WRA 6060 and WRA 7070**

Order number	Name	Description
52010479	MK-SHM-4IP	Shelf fitting kit for ARU 2400 Reader, WRA 6060, WRA 7070

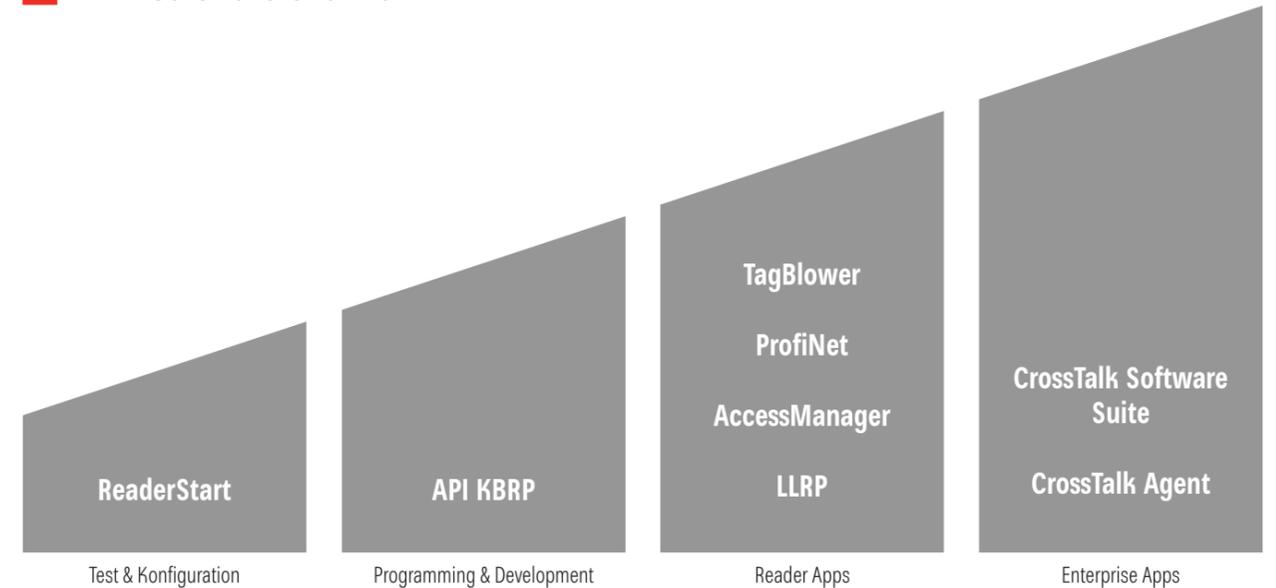




## RAIN RFID software portfolio

Kathrein Solutions' RFID portfolio with integrated Linux processor offers partners and customers the possibility to implement available Kathrein software variants or even their own apps directly on the device. Our flexible and highly functional product is the CrossTalk Software Suite.

### > RFID software overview



	CrossTalk	TagBlower App	ReaderStart (demo)	Access Manager	Profinet IO App	LLRP App	Reader API
KBRP support	check	check	check	check	check	check	check
Productive system	check	check		check	check	check	
Local file storage	check	check	check				
CSV generation	check	check	check				
HTTP data transmission	check	check					
Configuration/test software			check				
WhiteList handling	check			check			
Profinet					check		
MQTT business event	check						
XML / JSON generation	check						
Device management	check						
Cloud ready	check						
OPC-UA client	check						
Cloud ready	check						
Areas of application	<ul style="list-style-type: none"> <li>Logistics</li> <li>Healthcare</li> <li>Automotive</li> <li>Manufacturing</li> <li>Supply chain</li> <li>KanBan</li> <li>ITS</li> </ul>	Automatic raw data transmission	<ul style="list-style-type: none"> <li>Configuration</li> <li>Demonstration</li> <li>Test</li> </ul>	Access control	ProfiBUS applications	Low-level applications universal interface	Application development by partners



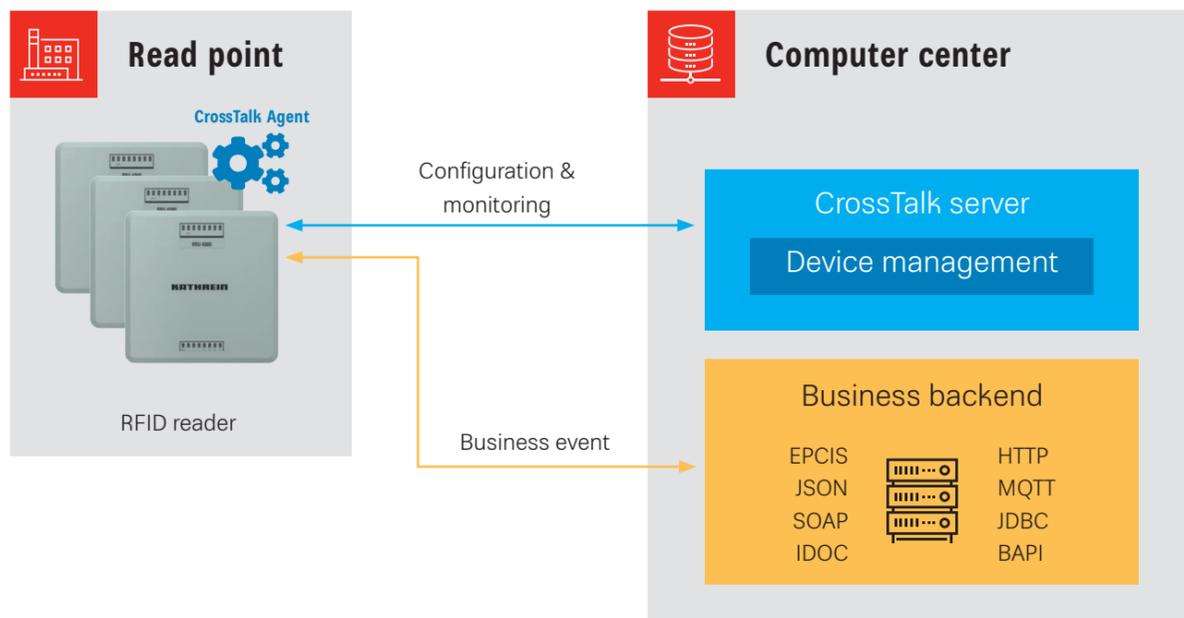
## > CrossTalk software suite

As with all complex systems, the perfect interplay of hardware and software is of crucial importance. CrossTalk rises to this challenge extremely effectively and simplifies implementation of a wide range of RAIN RFID customer requirements and solution requests with no additional development effort.

CrossTalk is the easiest way to create the perfect AutoID solution. It supports partners and customers from

the PoC (proof of concept) through to global rollout with secure and reliable 24/7 operation of the physical AutoID layer.

The agent-based architecture of CrossTalk supports operation of several thousands of devices using different technologies in a distributed network environment. Plug-and-play setup for a wide range of devices and models made by standard AutoID manufacturers is already integrated.



## > Kathrein software: order overview\*

Order number	Description
52010313	<b>CrossTalk BaseApp Center license:</b> device management platform, AutoID device drivers, AutoID process toolkit, infrastructure application, infrastructure documentation, rules engine, 3rd party backend integration - license per logical read point
52010385	<b>CrossTalk EPCIS repository:</b> event repository, capture & query & subscribe features - license per logical read point
52010317	<b>CrossTalk Software Contract:</b> CrossTalk maintenance and 3rd-level-support for 1 year

\*Available as one time purchase or yearly subscription model

## > CrossTalk Agent

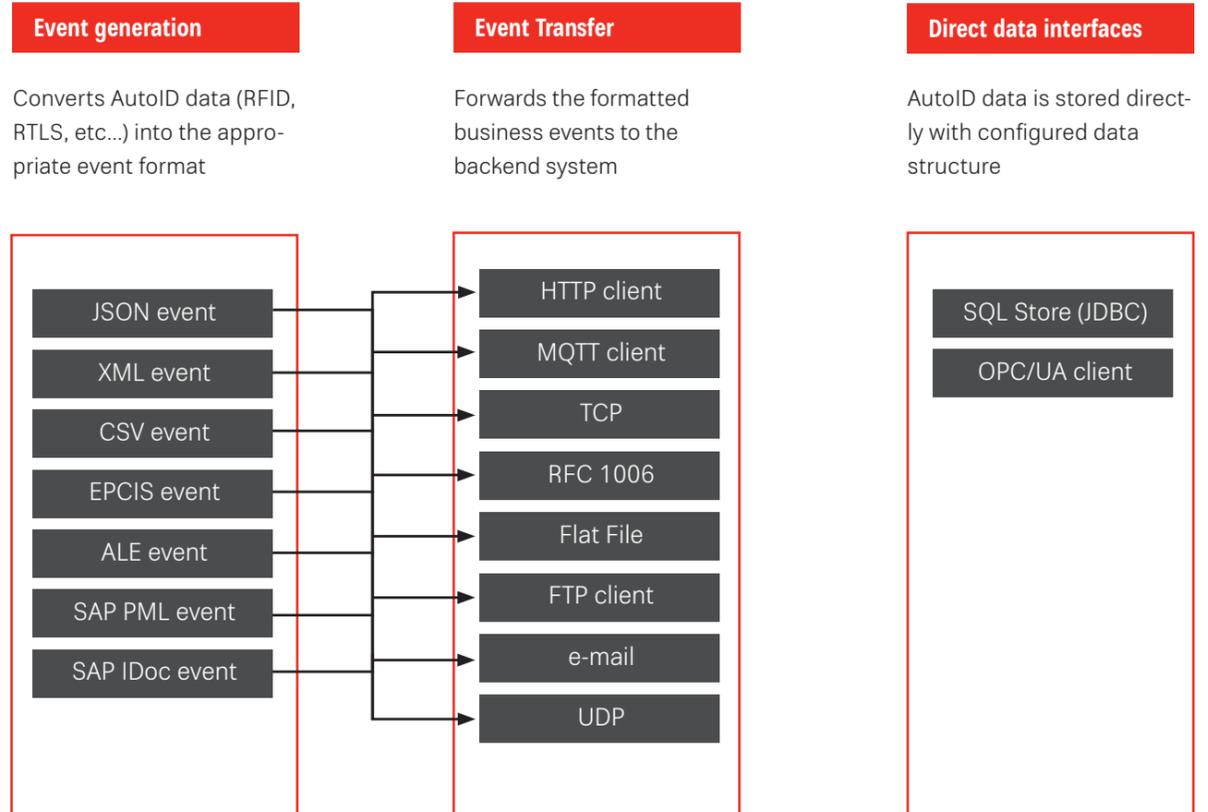
The CrossTalk Agent edgware is Java-based and therefore runs on a variety of platforms. Each agent is given its individual functionality once by a central CrossTalk server entity. The agent, which is ideally operated directly on the device, carries out its processing activities completely independently from this server entity.

The CrossTalk server is then only responsible for monitoring the agents in the background. This decentralized distribution of the process functionality among the CrossTalk agents provides high failure security for the AutoID reading points.

With a large number of existing data structures and communications adapters in productive use, it is possible to supply various backend systems with valid business events quickly and reliably.

### Core tasks of the edgware:

- Very easy integration of a wide range of AutoID manufacturers
- Real-time raw data processing
- Intelligent filtering of raw data
- Business event generation and transmission to the backend system





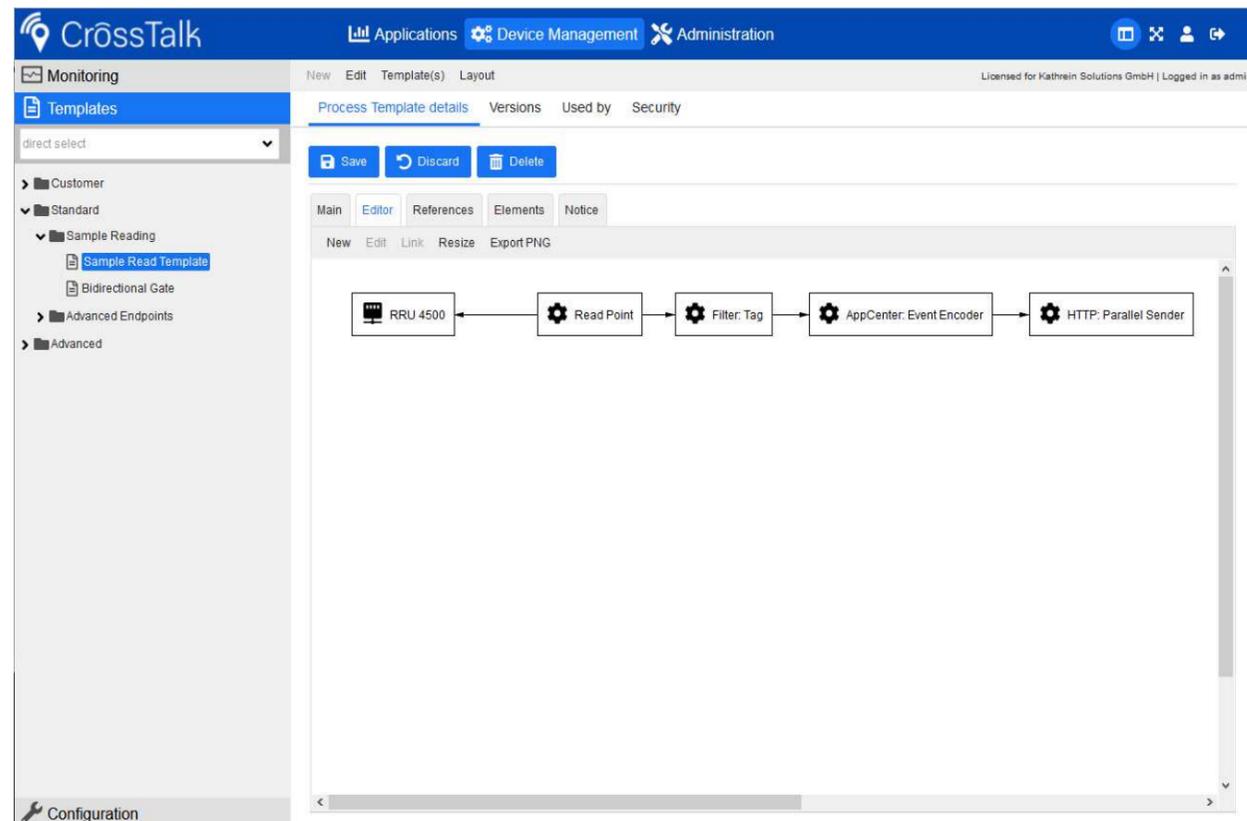
## > CrossTalk Server

The central server entity can be operated either “on-premise” or in a cloud. All that is required for this is a Java application server and standard SQL database.

The device management application on the server allows complete control of the AutoID landscape with devices from different manufacturers.

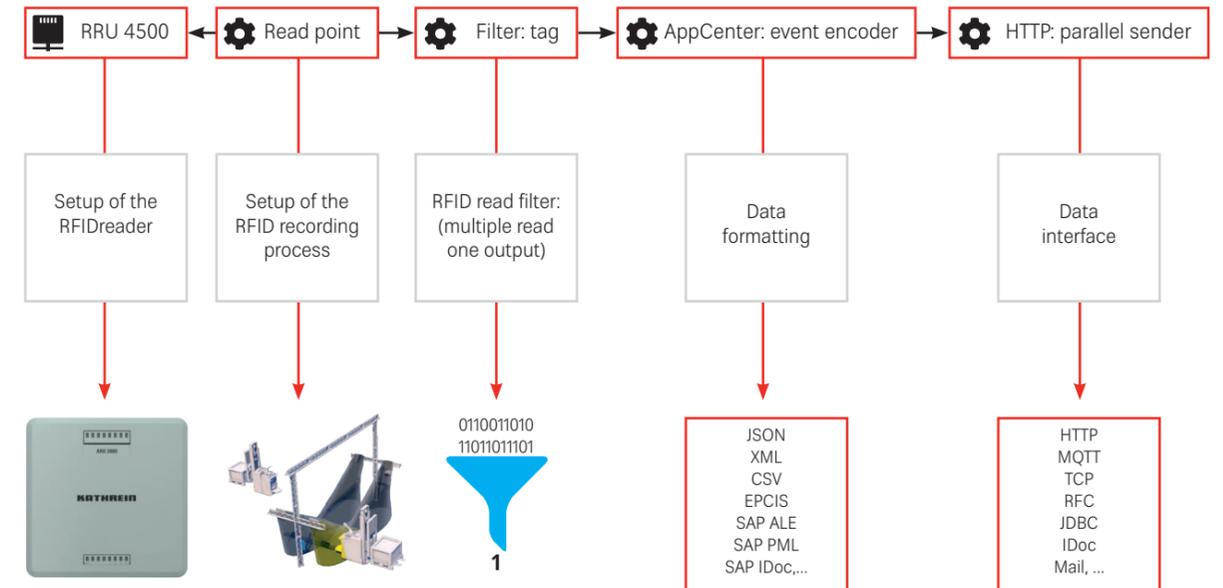
### Core tasks of device management:

- Organization and configuration of all CrossTalk Agents
- Monitoring and analysis of all functional modules in ongoing processes on the agents
- Design of process templates using a large number of existing function modules without programming effort in a graphical „no-code” designer
- Central distribution of updates (driver layer and functional modules)
- Simple rollout of a large number of agents and their processes, based on process templates already in existence
- Central alarm notification of maintenance teams if a functional module within the processes reports an error on the agent (central health REST API, e-mail)



Graphical template designer for the device management application

## > Typical functional modules of a process template



## > CrossTalk Mobile

With our Mobile Application Framework (MAF), we are able to make various mobile applications available.

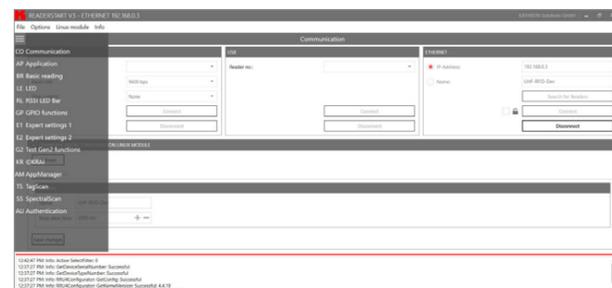
- Full support for Android mobile devices
- Simple device migration
- Access to existing modules
- Creation of smaller desktop or industrial PC terminal applications
- In addition to the MAF, native iOS application developments are possible



Figure: RFID handheld reader



> **Kathrein ReaderStart software**



**ReaderStart**

Kathrein Solutions offers a configuration and test software named ReaderStart. Using predefined templates, such as gate applications or vehicle identification, the reader can be preset with the push of a button and an initial reading result is available quickly. Only a few more settings are then required to adapt it to the final environment.

> **Kathrein reader application software**

**Profinet IO**

The Profinet IO app allows integration of a reader into a Profinet IO environment. This is typical for applications in production and allows the reader to communicate with the production control system. The reader thus acts as an IO device and transmits the transponder data it reads directly to the connected PLC. The reader is therefore the perfect data source in this production environment.

**Advantages:**

- Industrial Ethernet standard
- Fast IO communication
- High data rate

**TagBlower**

The TagBlower app is a simple application that makes it possible to distribute data quickly in a defined way. The data read are stored automatically at a predefined port and can be accessed and picked up by an external listener. In addition to the data read, status messages (e.g. "Transponder approaching") can also be issued. This range of data and status messages can be customized. Data can therefore be captured in simple applications or early in the realization phase.

**Advantages:**

- Multiple listeners
- Push notifications
- Configurable

**LLRP**

Die LLRP App von Kathrein Solutions ermöglicht eine standardisierte Kommunikation von Basis-Befehlen und Grunddaten zwischen dem RFID-Reader und einer Applikations-SW mit einem Standardprotokoll von EPCglobal. Dabei läuft diese App auf dem Reader internen Linux IPC und verbindet sich mit einem LLRP-Controller. Der Unterstützte Standard ist LLRP 1.0.1 und der definierte Übertragungspport ist 5084

**Advantages:**

- Standardized commands
- Universal data and configuration interface
- Standard transmission port 5084

> **Kathrein reader application software**

**AccessManager**

The AccessManager app from Kathrein Solutions combines RFID reading results with digital input and output signals (GPIO) and makes decisions on that basis. As a result, anything from access authorizations at parking garage barriers to sorting systems for containers can be managed autonomously. The starting point is an input signal from a light barrier or a sensor, which is read by a digital input on the reader. This starts an automatic process which reads transponder data and takes decisions on the basis of a predefined white list. These decisions can be sent to digital outputs immediately to

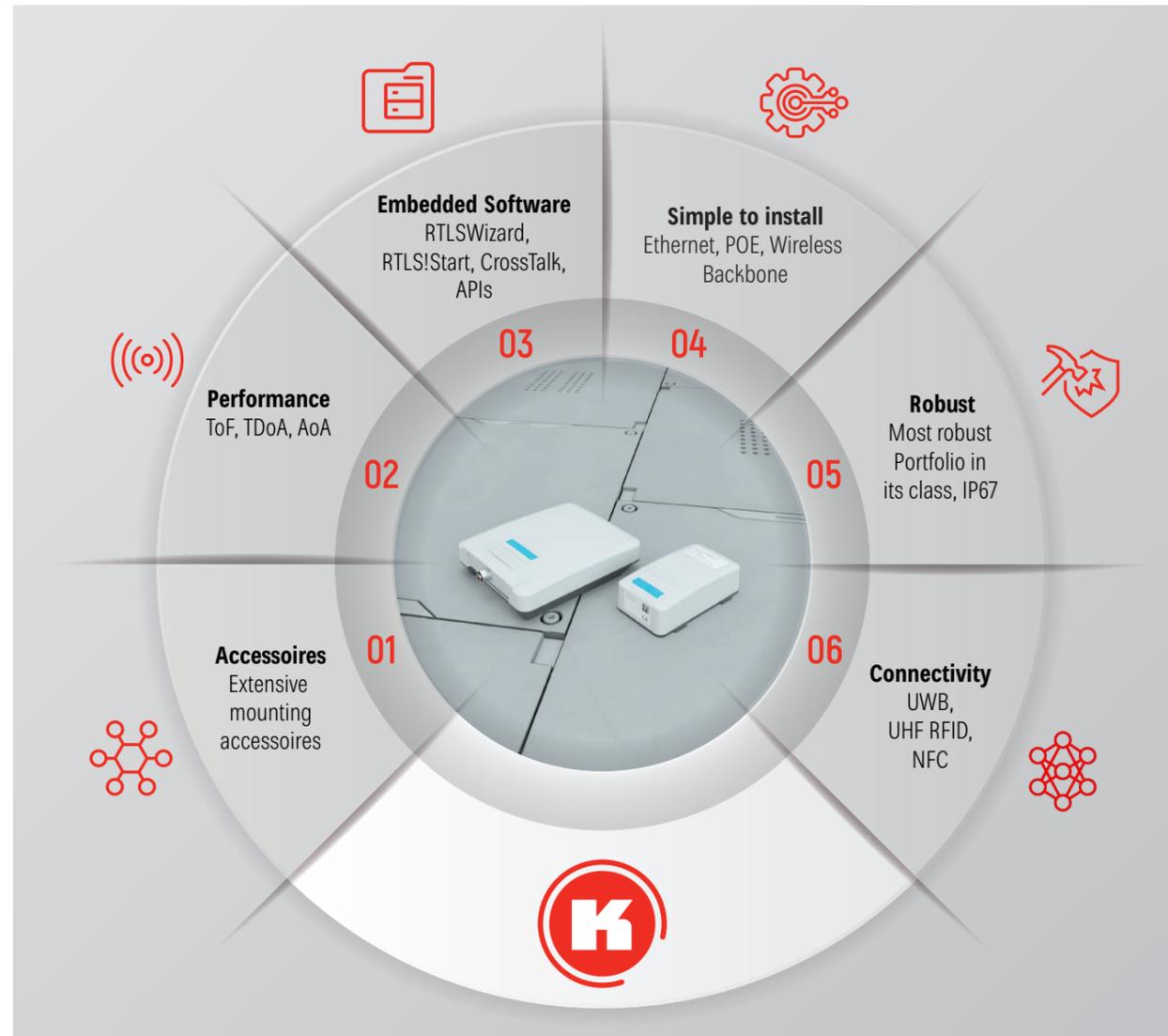
operate conveyor belt switches or parking barrier relays. Additionally, the LEDs on the reader can be activated to give the user visual feedback on the process.

The AccessManager allows rules to be created easily in the Linux operating system without any programming knowledge. In addition to the authorizations recorded, each reading event can be stored in a log file. The participant identification and precise time are recorded in an SQLite database. This information can be retrieved for a set period, with access via a remote connection or locally as a CSV or XML file.

**Kathrein software: order overview**

Order number	Name	Description
free*	ReaderStart test- and configuration software V3.11	for all Kathrein readers
free*	LLRP kommunikation protocol (low level reader protocol app V1.02)	for all Kathrein readers
52010375	Profinet app software	for all Kathrein readers
52010381	TagBlower app software	for all Kathrein readers
52010217	AC Manager software	for all Kathrein readers

\* free download from website



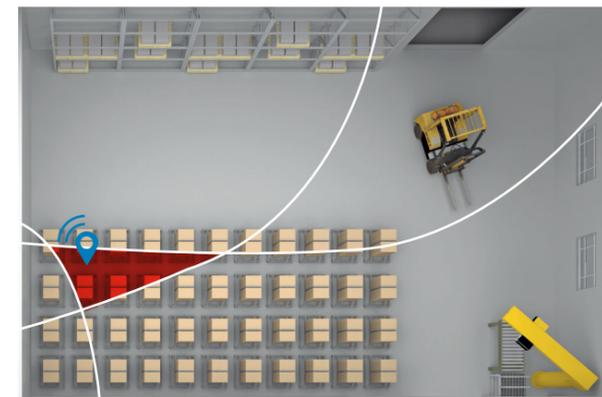
## K-RTLS hardware

The Kathrein Solutions “K-RTLS” real-time localization system combines high localization accuracy in the industrial environment with unique technical properties that allow broad use in a wide variety of applications. Precise monitoring of the progress of manufacturing in the production environment or transparent material flow in intralogistics are only two of many possible applications. The real-time data available about the location and condition of objects with the K-RTLS form the basis for networking of processes in the value creation chain. A new feature in model year 2023 is outdoor localization. With the Angle-of-Arrival (AoA) mode, goods, pallets or vehicles can be detected without any doubt, even if the storage location is outdoors.

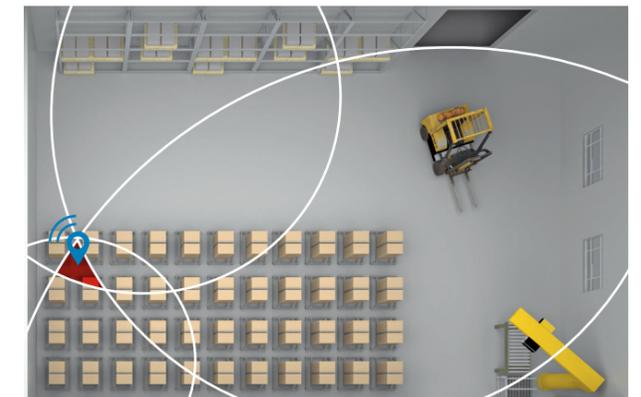
## > K-RTLS modes

Two parameters are always in the foreground with localization applications, Localization accuracy and frequency. There are some applications that require precise determination of position. Here, the end position of a movement is recorded with high accuracy. This is used, in particular, for movements within the warehouse or in production. The alternative is constant recording of the travel, with slightly less precise intermediate values – however, this does allow fast evaluation

of the route or travel range (heat map). In particular, this mode is used when switching between recording areas, e.g. for movements from production to the warehouse. Because these two modes may not be allowed outdoors, Kathrein has introduced the Angle of Arrival mode for such application. All three modes are supported by the K-RTLS solution from Kathrein Solutions.



Highly dynamic RTLS: Time Difference of Arrival (TDoA), accurate up to 75 cm.



High-precision RTLS: Time of Flight (ToF), accurate up to 25 cm.



Outdoor Modus RTLS: Angle of Arrival (AoA) accurate up to 100 cm.



## > K-RTLS transponder

- K-RTLS transponder RTLS-T-1000 offers localization accuracy of up to 25 cm
- Time of Flight (ToF) mode for high accuracy
- Time Difference of Arrival (TDoA) mode for long battery life in dynamic applications applications
- Angle of Arrival (AoA) mode for outdoor applications
- Combination of UWB, RAIN RFID and NFC technology in a robust IP67 housing
- Easy integration into existing AutoID infrastructure
- Use of RFID UHF tags for detection up to 10 m
- RFID NFC tag for near-field detection and smartphone communication
- Transponder mode for using the node as a transponder; reporting its position to other nodes



Order number	53010002	53010001
<b>Name</b>	<b>RTLS-T-1000-67</b>	<b>RTLS-N-1000-67*</b>
UWB localization		
Frequency range [MHz]	3244-6999	
Transmit power at the antenna [dBm]	-41.3	
Input sensitivity [dBm/500MHz]	-93 to -106/500 (1% packet error rate)	
Coverage [m]	approx. 80 in the line of sight	
Standards	IEEE 802.15.4 UWB, EN301489-3, EN50364, EN62368-1, EN60529	IEEE 802.15.4 UWB, EN301489-3, EN50364, EN62368-1, EN60529, FCC Part15, UL, IC
<b>RFID UHF</b>		
Frequency range [MHz]	860–960	-
Connection	I <sup>2</sup> C	-
Standards	ISO 18000-6C (Gen2)	-
<b>RFID NFC</b>		
Frequency range [MHz]	13.56	-
Connection	I <sup>2</sup> C	-
Standards	ISO/IEC 14443, Part 2 and Part 3	-

\* The RTLS node can also be used as a transponder by software command

## > K-RTLS transponder

Order number	53010002	53010001
<b>Name</b>	<b>RTLS-T-1000-67</b>	<b>RTLS-N-1000-67*</b>
Power supply		
Type	Battery** (CR123A (EIC-CR17345), exchangeable)	PoE+, local supply
Battery capacity [Ah]	1.5	-
Rated voltage [V]	3	-
Typ. battery life (at min. requirements)	> 5 years***	-
Connection	-	M12, X-coded, 8-pin, female
Remote power supply	-	PoE+ according to 802.3af (10-57)
Power supply consumption [W]	-	2.5
Remote power supply consumption [W]	-	IEEE 802.3af PoE Class 0; 0.44-12.06
LED visualization		
Status display	1 multi-colour LED	
<b>Mechanical properties</b>		
Protection class	IP67	
Operating temperature range [°C]	-40 to +50	
Storage temperature range [°C]	-40 to +85	
Dimensions (L x W x H) [mm]	92 x 54 x 30	160x135x37

\* The RTLS node can also be used as a transponder by software command \*\* The battery is an accessory and is not supplied

\*\*\* Depends on update rate, localization accuracy and period of use

### Accessoires

Order number	Description
53010003	RTLS-T-MPC support plate for transponder assembly
53010007	RTLS-T battery, CR123A (EIC-CR17345), 12-pack
52010006	RTLS-N node wall/pole fitting set



## > K-RTLS node

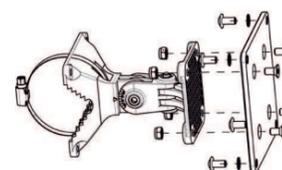
- K-RTLS Node RTLS-N-1000 new IoT standard for positioning/tracking solutions
- Fixed anchor and reference point for transponders
- Delivery of localization results to CrossTalk or evaluation software via the Kathrein RTLS API
- Time of Flight (ToF) mode for high-precision determination of the final end point
- Time Difference of Arrival (TDoA) mode for recording the real-time position; Permanent tracking of the intermediate position for creating a movement profile
- Angle of Arrival (AoA) mode for outdoor applications
- Transponder mode for using the node as a transponder; reporting its position to other nodes



Order number	53010000	53010001
Name	RTLS-N-1000-40	RTLS-N-1000-67
UWB localization		
Frequency range [MHz]	3244-6999	
Transmission power at the antenna [dBm]	-41.3	
Coverage [m]	approx. 80 in the line of sight	
Standards	IEEE 802.15.4 UWB, EN301489-3, EN50364, EN62368-1, EN60529, FCC Part15, UL, IC	
2.4-GHz communication link		
Frequency range [MHz]	2400-2483.5	
Standards	IEEE 802.15.4:2006, IEEE 802.15.4:2011, IEEE 802.15.4:2012, IEEE 02.15.4:2015	
Ethernet		
Number of Ethernet connections	1	
Connection	RJ45	M12, X-coded, 8-pin, female
Voltage		
Typ	PoE+, local supply	
Connector	M 12, X-coded, 8-pin, femate	
Remote power supply	PoE+ according to 802.3af (10-57)	
Power supply consumption [W]	2.5	
Remote power supply consumptions [W]	IEEE 802.3af PoE Class 0; 0.44-12.06	
LED visualization		
Status display	1 multi-colour LED	
Mechanical properties		
Protection class	IP40	IP67
Operating temperature range [°C]	-40 to +50	
Storage temperature range [°C]	-40 to +85	
Dimensions (L x W x H) [mm]	160 x 135 x 37	

## > K-RTLS accessoires

Order number	Name	Description
53010006	RTLS-N-WPM	RTLS-N node wall/pole fitting set
53010003	RTLS-T-MPC	RTLS-T support plate for transponder assembly
53010007	RTLS-T-BAT	RTLS-T battery, CR123A (EIC-CR17345), 12-pack
52010474	R-RPA 24DC-18W	AC/DC power supply unit 24 V/18 W, AC 110–230 V, mains plug device, replaceable AC plug



53010006



53010003



53010007



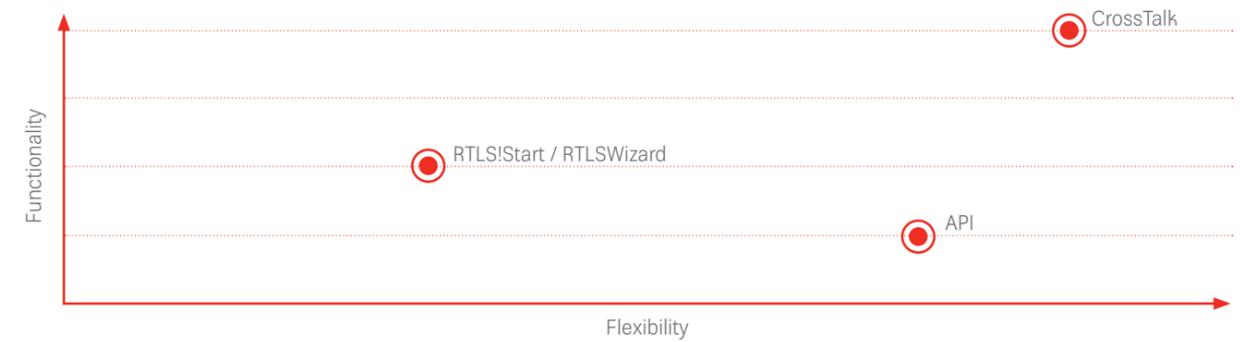
52010474



## K-RTLS software

Kathrein Solutions offers partners and customers the opportunity to implement the K-RTLS system with the API provided or allows rapid entry to the world of RTLS with the aid of the CrossTalk productive solution.

### > RTLS software overview



	CrossTalk	RTLS!Start / RTLSWizard	K-RTLS Positioning API
KSRP support	check	check	check
Calculation of the transponder position	check	check	check
Productive system	check		check
RTLS demo		check	
Configuration/test software		check	
Positioning (saving raw data in CSV/XML format)		check	
HTTP data transmission	check		
MQTT business event	check		
XML / JSON event generation	check		
Zoning business event	check		
Device management	check		
Cloud ready	check		
Areas of application	<ul style="list-style-type: none"> <li>· Logistics</li> <li>· Healthcare</li> <li>· Automotive</li> <li>· Manufacturing</li> <li>· Supply chain</li> <li>· KanBan</li> </ul>	<ul style="list-style-type: none"> <li>· Configuration</li> <li>· Demonstration <sup>1)</sup></li> <li>· Test</li> </ul>	Application development by partners

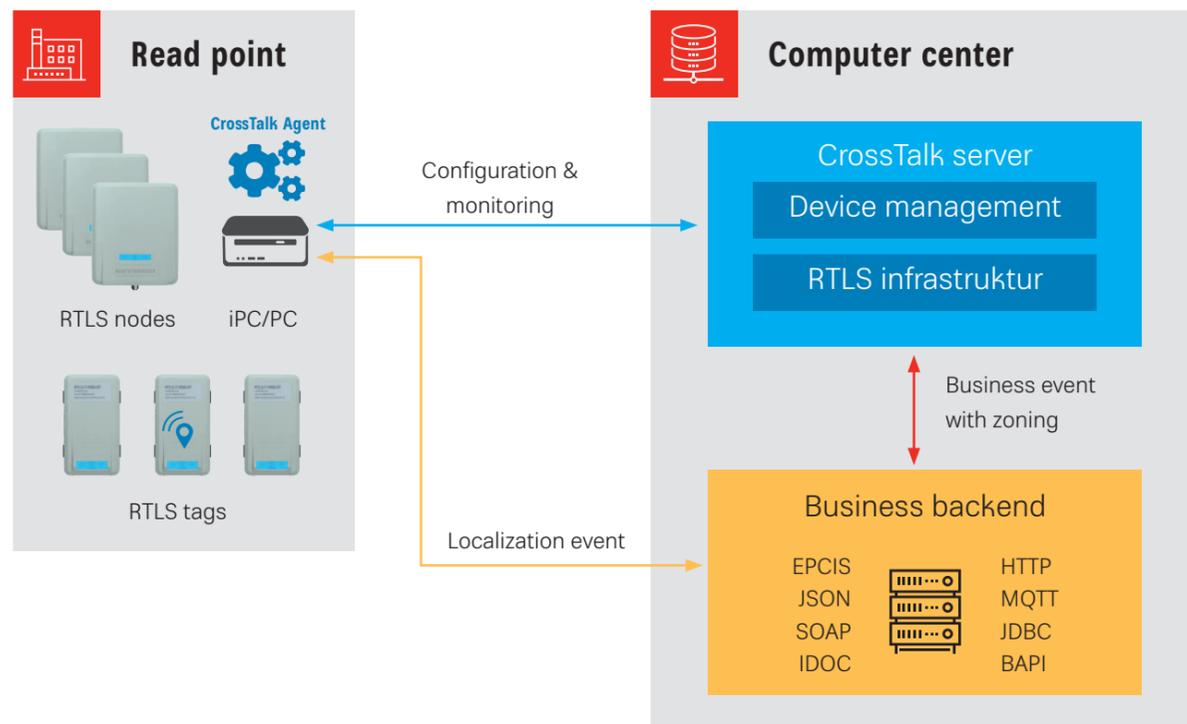
1) with the RTLS!Wizard the different operating modes of the K-RTLS are visualized



## > CrossTalk software suite

As with all complex systems, the perfect interplay of hardware and software is of crucial importance. CrossTalk rises to this challenge extremely effectively and simplifies implementation of a wide range of RTLS customer requirements and solution requests with no additional development effort. CrossTalk is the easiest way to create the perfect localization solution. It supports partners and customers

from the PoC (proof of concept) through to global rollout with secure and reliable 24/7 operation of the physical AutoID layer. The agent-based architecture of CrossTalk supports operation of several thousands of devices using different technology in a distributed network environment. Plug-and-play setup for a wide range of devices and models made by standard AutoID manufacturers is already integrated.

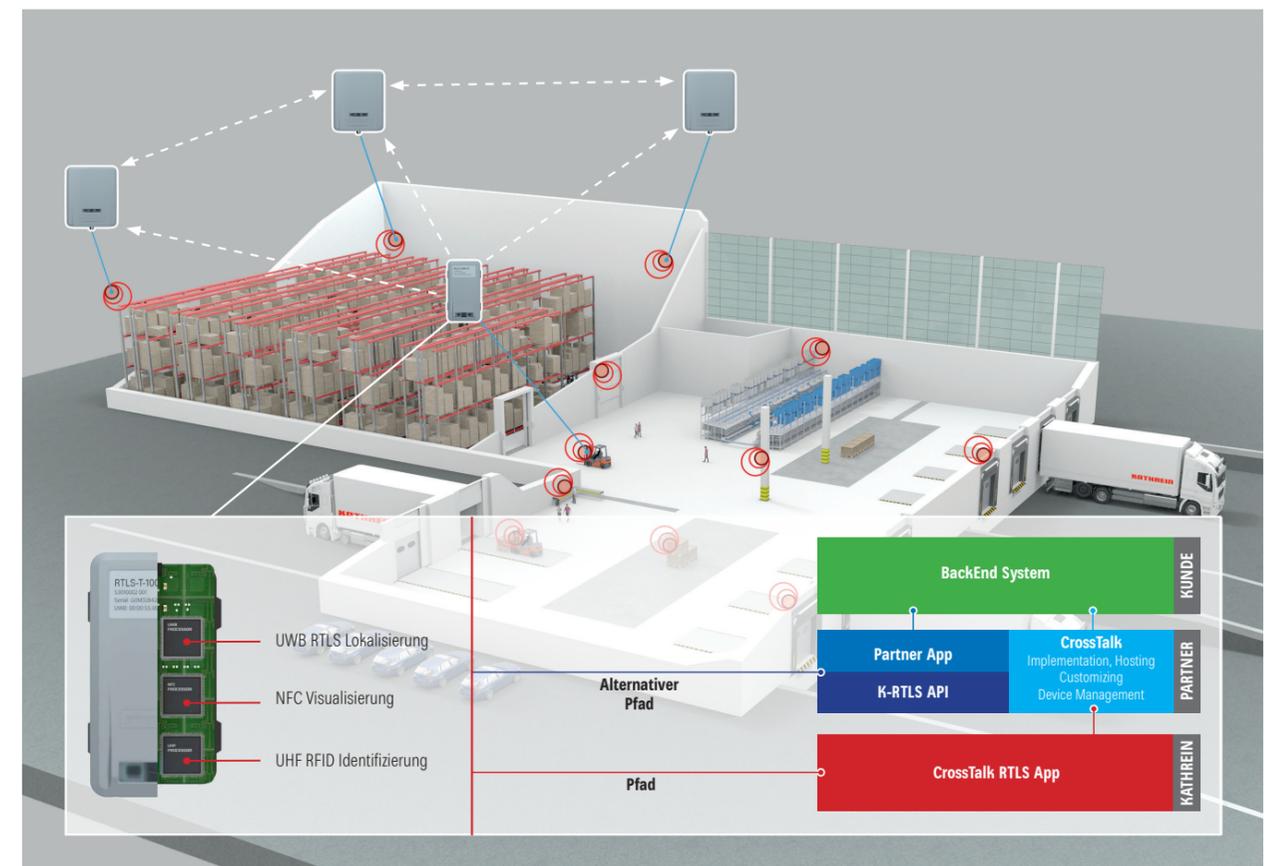


## > CrossTalk Agent

- Localization on a local IPC or PC
- Configuration of node and tag
- Calculation of the tag position by means of the measurement data from the nodes
- Filtering and buffering of the tag position data

## > CrossTalk Server

- Visual zone editor
- Geo-localization and geo-fencing
- Repository for the RTLS device configuration
- Monitoring of the devices and functional modules
- Zone allocation events are sent directly to the business backend
- Many interface adapters ready for immediate use

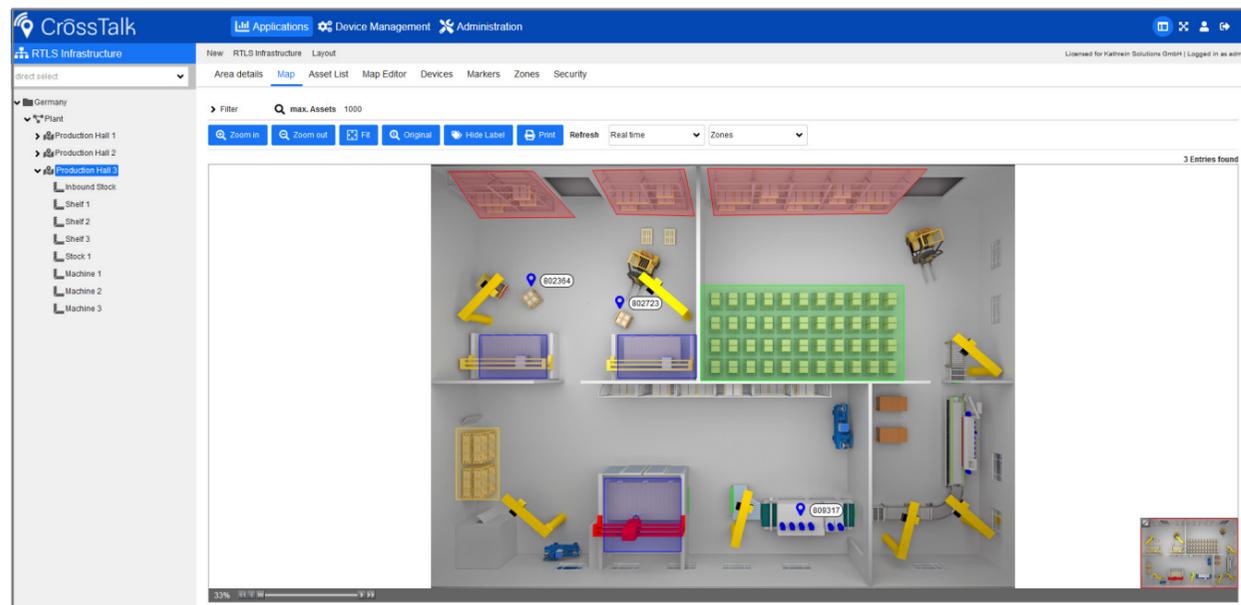




## > RTLS infrastructure application

The RTLS infrastructure application on the server is the link between the physical AutoID device layer and the business logic of the backend system.

- Creates any location hierarchy using location, range and zone elements
- Visual objects in geo-based and layout-based maps
- Visual location editor for loading and calibrating maps, drawing and moving zones
- Defines the tolerance of the zone limits and the geo-fencing to prevent an unwanted change of zone
- Deals with the localization events of active RTLS systems and passive RFID solutions
- Defines fixed reading points as positioning marks and gate movements (RFID)
- Forwards logical localization events as business events to other apps or backend systems



Visual zone editor of the RTLS infrastructure application

## > RTLS!Start / RTLSWizard

Kathrein provides the RTLS!Start tool free of charge for commissioning and testing RTLS components. It allows the operating mode to be set for the nodes and transponders and all the settings to be saved. All the spatial parameters and all the HF properties can be configured. All localization results can also be recorded and logged. Installation and commissioning of the system is therefore easy. Nothing more than a laptop and a yardstick is required.

We recommend CrossTalk software for operation of a Kathrein RTLS system. This controls the nodes involved and compiles the reading results. These functions

are also available as an API for easy development of customized solutions.

The functions and operating modes described previously are available with both CrossTalk and software solutions based on the Kathrein API.

To get to know the three operating modes Time-of-Flight (ToF, for high-precision localization), Time-Difference-of-Arrival (TDoA; for highly dynamic localization) and Angle-of-Arrival (AoA, for localization in the open), Kathrein offers the RTLSWizard SW. It is primarily aimed at users who are new to the topic of RTLS.

## > Kathrein software: Order overview\*

Order number	Description
free **	<b>RTLSWizard:</b> Demo application software
free **	<b>RTLS!Start:</b> Test and configuration software
53010011	<b>CrossTalk RTLS license:</b> RTLS device management platform, RTLS infrastructure application, infrastructure documentation, positioning engine, rules engine, 3rd party backend integration - license per RTLS dode
52010385	<b>CrossTalk EPCIS repository:</b> Event repository, capture & query & subscribe features - license per logical read point
52010317	<b>CrossTalk support:</b> 3rd level support for 1 year - 20% of the license costs for the used licenses

\*Available as one time purchase or yearly subscription model

\*\* free download from website



## Professional services

The extensive foundation of the Kathrein Solutions IoT portfolio is available to its partners within the KATHREIN partner ecosystem and the end customers at any time and in all phases of the project.

The Professional Services team ensures successful project implementation with its pre-sales, consulting, project management and training academy services. In addition, Professional Services is available via 3rd level software support to ensure the availability of the systems installed in the field.

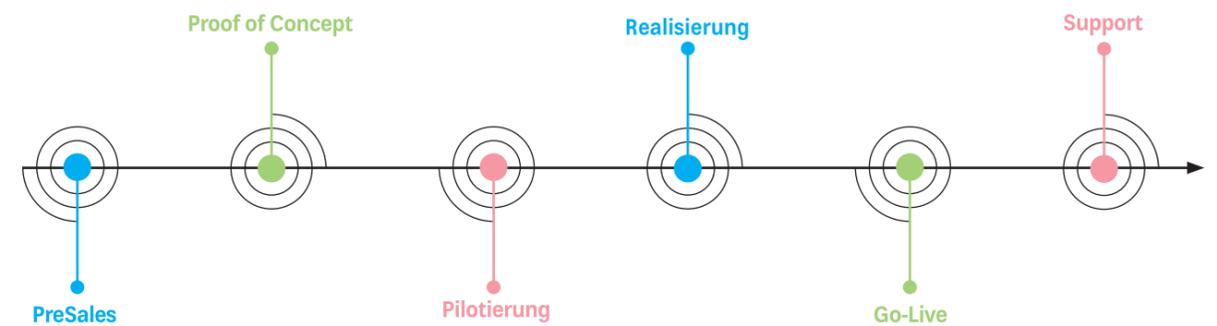
This leads to highly efficient and competent order acquisition as well as successful project implementation.

## > Consulting

### Technology consulting directly from the experts

Our experienced, multidisciplinary team of consultants offers you individual advising to move your project forward with the right solutions.

With a multitude of projects successfully completed in a wide range of industries, we can apply our expertise in the areas of RFID and RTLS to any phase of the project you like.



Through the combination of your industry knowledge and experience of your day-to-day business and our expertise in technology and experience from a large number of projects, we are able to work with you to develop a concept that suits your digitization strategy. We play to our strengths in both theory and practice. But the starting point is always your idea, and we begin by listening. We discuss your idea together and refine it into a solution concept through our approach to consulting. Then we set out a common solution pathway together to turn your idea into a practical application. Various tried-and-tested methodologies and approaches are available to us here:

- Software-based simulations of individual systems
- Application-based transponder qualification Including coding scheme
- Process analysis and optimization through workshops
- Process-based selection of suitable products (hardware & software)

- Application-based feasibility study (PoC) in our Test Center
- Realistic feasibility study (PoC) in your company
- Transponder calibration in our measurement chambers
- Process assurance through pilot operation with analysis/evaluation of live data
- Template design for CrossTalk applications
- CrossTalk installation and configuration consulting
- Interface integration/management
- Raw data analysis of the completed application

The key to our success is our holistic consideration of the various system parameters, both those that are obviously relevant and those that may, at first sight, appear unimportant. We customize our solution portfolio of hardware, software and services to meet your requirements so that we can offer you maximum quality and performance in every phase of your project.



**Consulting order overview**

Order number	Name	Description
52010321	Blueprinting services	We carry out a feasibility study to check your approach to the project, select the best technology for it and determine the estimated project costs. We develop a customized concept for you based on these findings. We provide you with relevant information so that you can make the most effective decision about your project on a sound basis and with an eye to the future.
52010330	Documentation	A crucial factor in the success of planned projects is transparent documentation in accordance with the amount of work involved. We ensure that all the work packets are properly documented in full.
52010323	Application Engineer (HF & Filed Analysis)	Our consulting managers form the core of the department. From consulting and planning activities to realization and acceptance, our team is at your disposal.
52010138	Test center & engineer support	Our Kathrein Test and Application Center makes it possible to evaluate ideas and concepts in advance for reliable concept workshops and effective physical tests in a simulated real environment. This avoids any disruptions to your productive operations.
52010572	General support	If you require general hardware and/or software support from our consulting team for a specific period, we'll give you the option of booking a support package.
52010569	Travel time	Time for return travel
52010570	Travel costs	Individual costs, such as air/train ticket, subsistence allowance, car rental, etc.
52010571	Overnight accommodation	Hotel costs, etc.

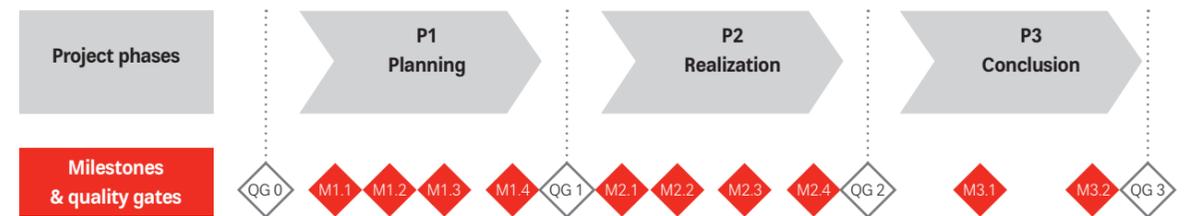
**Project management**

**“Tell me how your project starts and I’ll tell you how it ends.”**

Make the most of our many years of expertise in project management to implement your projects successfully. As an official Kathrein partner or allocated key customer, you can look forward to planning and delivering your projects with our certified project managers. In projects, as in consulting, our approach is to listen. In the spirit of the heading, we align our own project management process with RFID and RTLS projects.

Depending on the project size, duration and degree of complexity, we work with you to choose the model we will use for your project in accordance with the project management handbook specially developed for it. The finishing touch to the project work is provided by our use of the latest software (e.g. Microsoft Project, easyREDMINE) to give you maximum transparency in relation to time, costs and quality.

The graphic below shows our most popular, most flexible model for delivering projects.



With our approach to project management, we aim to achieve the best possible distribution of resources and experts in our project landscape for the Kathrein team assigned to you.

Our certified project managers are available to you as main contacts or escalation authorities throughout the project, depending on the type of commission.



## > Project management order overview

Order number	Name	Description
52010322	Project management	Our certified project managers ensure that your project is planned, controlled and concluded transparently and effectively throughout the duration of the project.
52010330	Documentation	A crucial factor in the success of any project is transparent documentation in accordance with the amount of work involved. We ensure that all the work packages are properly documented in full.
52010325	Hardware installation/assembly	Depending on complexity, we decide either to install the reading points ourselves or to appoint our established installation partners to do so.
52010316	Software installation/configuration	You decide whether you'd prefer to do this yourself, require our support for some of it or leave it entirely to us (assuming there is remote access).
52010315	Software customizing/development	If your project differs from the standard, we are happy to offer you customization in our software landscape.
52010323	Application Engineer (HF & Field Analysis)	Our consulting managers form the core of the department. From consulting and planning activities to realization and acceptance, our team is at your disposal.
52010324	Integration test	Structured, successfully completed test phases are the prerequisite for smooth commissioning. With our generic test model (basic, functional and measurement tests), we are happy to support you along the way.
52010329	Go-live support	We are available to you as a sparring partner for a defined period after commissioning in order to make your start-up as easy as possible.
52010569	Travel time	Time for return travel
52010570	Travel costs	Individual costs, such as air/train ticket, subsistence allowance, car rental, etc.
52010571	Overnight accommodation	Hotel costs, etc.

## > Training

### KATRAC – our KATHREIN Training Academy.

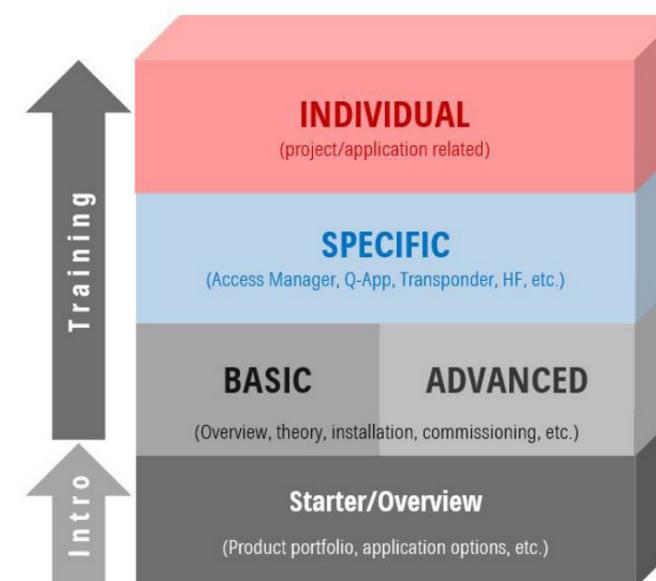
We have set ourselves the aim of combining our RFID and RTLS expertise with our own Kathrein product and solution portfolio to allow us to develop your personal expertise. We are certain that this extra knowledge will give you the edge in terms of time, costs and quality when it comes to delivering your own or our joint projects. We are experts in our field – and we also enjoy turning you into experts, too.

Our modules are so flexible that we can offer everyone new ways of developing their knowledge, from inexperienced rookies to those with many years of experience. Beyond the standard modules, we will be happy to take the time to plan and deliver an individual training course for you, customized to your needs. We also offer you various ways of providing the training.

Choose your preferred variant:

- an in-house course
- a course on our premises in Stephanskirchen (including the Test Center)
- or online by video conference

The graphic provides an overview of our modules. We're sure to have the right course for you, no matter your areas of interest (sales or technical focus).





## > Training order overview

Order number	Name	Description
52010665	KATRAC - BASIC training	Our <b>BASIC Module</b> opens the door to the world of UHF RFID. With both training days we focus on theoretical basics and practical usage with the solution portfolio of Kathrein Solutions GmbH.
52010666	KATRAC - ADVANCED training	Our <b>ADVANCED Module</b> is for users with basic knowledge of UHF RFID. With both training days we focus on conveying expert knowledge and advanced practical usage with the solution portfolio of Kathrein Solutions GmbH.
52010667	KATRAC - SPECIFIC training	Our <b>SPECIFIC module</b> can be designed according to your wishes for specific single applications, which are only cut or not included in the BASIC or ADVANCED module. The training concept is drawn up in advance in joint coordination.
52010668	KATRAC - INDIVIDUAL training	Our <b>INDIVIDUAL module</b> is our most flexible component. In close coordination, for example, an individual training plan can be created or we accompany you individually in your own project via training-on-the-job.
52010569	Travel time	Time for return travel
52010570	Travel costs	Individual costs, such as air/train ticket, subsistence allowance, car rental, etc.
52010571	Overnight accommodation	Hotel costs, etc.

## > Support

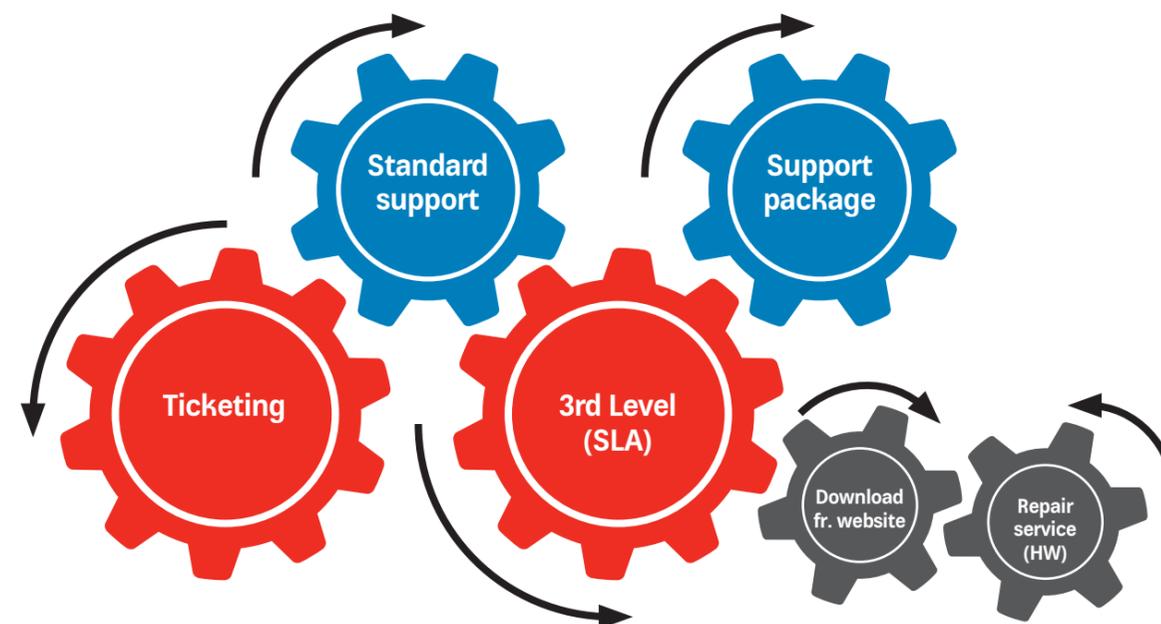
### Support – for all phases of your project

Our versatile support is the final module, rounding off our current service portfolio for you. In addition to specific content, such as consulting, project management

and the Training Academy, we also offer you a wide range of support options. Decide for yourself how you want to utilize them.

### Here are a few suggestions:

- Support package (person days)
- CrossTalk maintenance and 3rd level support services
- Support contract (term-based)
- Standard support for Kathrein partners
- Ticketing via email
- Download portal specifically for CrossTalk
- Hardware repair service
- Go-live support (see also project management)
- Download of firmware, apps and documentation from homepage





## > Support order overview

Order number	Name	Description
52010572	General support	person days over a set period
52010317	Software maintenance contract	CrossTalk 3rd-level remote support with a term of one year
52010569	Travel time	Time for return travel
52010570	Travel costs	Individual costs, such as air/train ticket, subsistence allowance, car rental, etc.
52010571	Overnight accommodation	Hotel costs, etc.

## > Ticketing process

If you have technical questions, you can simply send us a ticket by email.

Contact: [support@kathrein-solutions.com](mailto:support@kathrein-solutions.com)

Regardless of whether your questions relate to our hardware or software applications, they will be forwarded to the appropriate specialist in our support team, who will promptly deal with your enquiry.

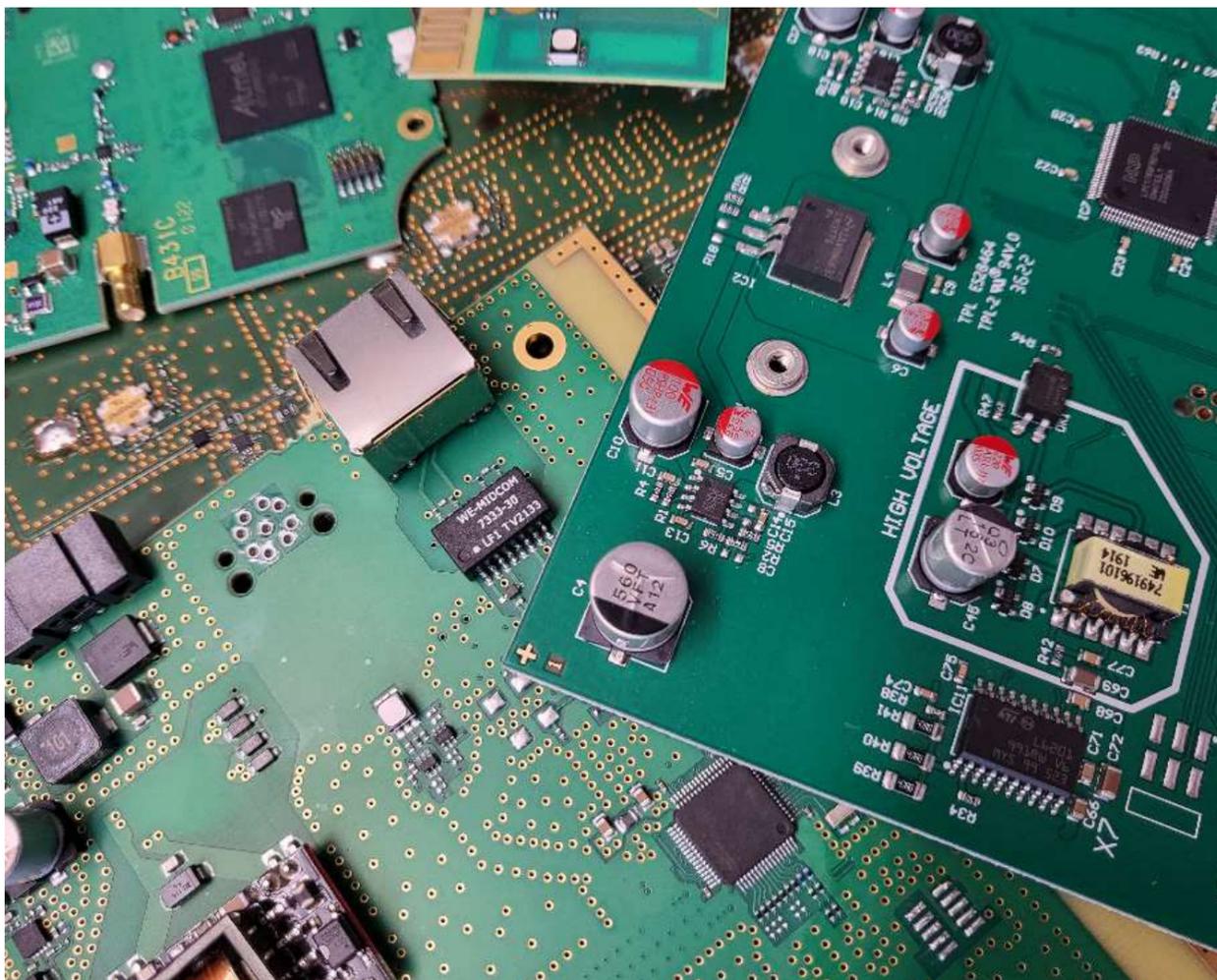
You can also find this address on our homepage via the "support" tab:

[www.kathrein-solutions.com/de/support/ticketing-system](http://www.kathrein-solutions.com/de/support/ticketing-system)

### Overview of your Advantages

- Easy creation of a ticket by email including automatic confirmation of receipt
- High availability during working hours using our central mailbox
- Uniform incoming inspection and content-oriented distribution to the appropriate expert
- Continuous and automated tracking of your tickets so that nothing is left behind
- Complete documentation of all actions within the ticket (mail history)





## Customised solutions & individual development

In addition to an extensive hardware and software portfolio, Kathrein Solutions also offers its partners individual developments and OEM solutions for wireless identification and localization using RFID, RTLS and BLE, as well as the development of embedded transponders, high-security transponders, windshield labels and headlamp tags. Where „off-the-shelf“ solutions reach their limits, the development departments offer a wide range of options for implementing customers' digitalization and IoT visions.

### > Customized Solutions

In today's digital world, it is essential for companies to find innovative solutions to optimize their processes and increase their competitiveness. Kathrein Solutions enables the development of customized solutions for your digital transformation.

As your partner in RFID, RTLS, IoT and more, we offer solutions tailored to your specific needs and projects. We cover a wide range of wireless technologies and products to meet your individual requirements:

### RFID (Radio-Frequency Identification)

We offer RFID technologies that enable you to track and manage items and assets efficiently. Our solutions include RFID readers, antennas and customized transponders tailored specifically to your application. We also have expertise in sensor transponders. These offer advanced functions, including pressure, temperature and humidity sensors. Such transponders allow real-time monitoring and data collection in various applications, from warehousing to quality assurance.

We support a variety of frequency ranges, standards and wireless protocols to ensure we can provide the right technology for your requirements:

- HF (High Frequency, ISO 14443, 15693)
- NFC (Near Field Communication)
- UHF (Ultra High Frequency, ISO 18000-63C)
- RAIN RFID

Whether NFC for reading an intelligent type plate, UHF for recording thousands of products in logistics tracking or HF as a standard for access control, Kathrein offers a customized solution.

### BLE (Bluetooth Low Energy)

Our Bluetooth Low Energy solutions, including transponders and beacons, enable precise localization, tracking and access control. This technology offers high accuracy and efficiency when tracking assets or people indoors and outdoors. We support the latest standards from Bluetooth 4.0 to 5.2.



E-bike tracker with BLE technology



Ski gate with BLE technology

## RTLS (Real-Time Location Systems)

Our RTLS solutions include nodes/anchors and transponders/beacons that work using UWB. This enables highly precise localization and tracking of objects, almost in real time. The Kathrein RTLS platform (K-RTLS) offers a variety of different measurement methods, each of which can be ideally configured for your application. The different methods „Angle of Arrival“ (AoA), „Time of Flight“ (ToF) and „Time Difference of Arrival“ (TDoA) each differ in speed, precision, energy efficiency and outdoor capability.

## Software

Our advanced software CrossTalk Software Suite enables seamless integration and management of your wireless systems. It offers powerful tools for data analysis, reporting and optimization of your processes.

## > Development process

Our approach to providing customized solutions follows a structured process consisting of six main phases:

### 1. Evaluation

- Analysis of specific customer requirements and objectives
- Selection of the appropriate technical and economic solution based on RAIN RFID, Bluetooth and/or UWB RTLS

### 2. Conceptualization

- Creation of the system architecture with regard to individual antennas, transponders, hardware and embedded software
- Determination of the development effort and creation of a project plan
- Consideration of all product-specific aspects, from functionality to design

### 3. Simulation - (Virtual) Proof of Concept

- Proof of concept to determine the feasibility of the planned project in our in-house test center
- Optional virtual proof of concept with complex simulation software
- Creation of a robust project concept

### 4. Development

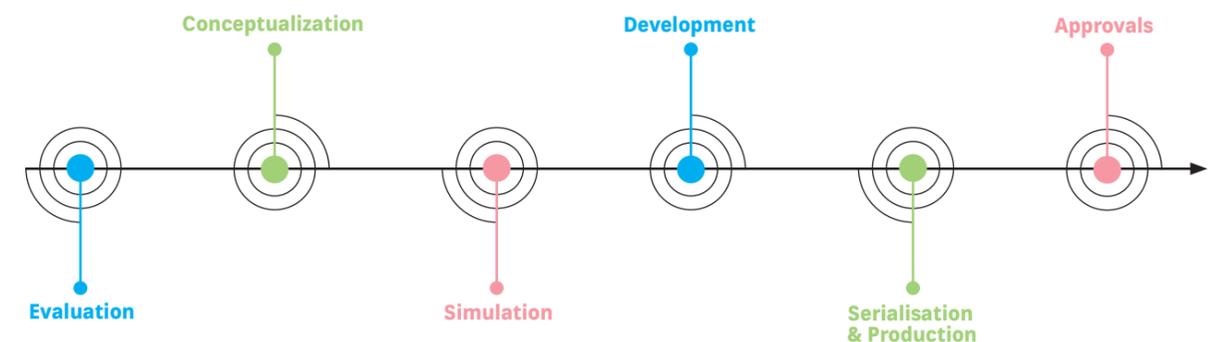
- Putting the concept into practice: development of a high-quality product that meets the specific requirements
- Continuous testing of development results with state-of-the-art EM simulation tools and measurement capabilities

### 5. Serialization and production

- Preparation of the product for mass production
- Sample production, measurements, performance testing in the real environment, comparison with the simulations
- Production of the developed products; ensuring quality with regard to their specific properties
- After-sales support

### 6. Approvals

- If required: complete takeover of approval activities
- Access to worldwide testing laboratories for competent and prompt certification



> **Development process in detail**

**Concept phase**

We offer our partners expert advice from concept development to series production of specific OEM products and solutions. Our many years of experience in the development of wireless identification and localization systems enable us to analyse specific OEM customer requirements and work with you to select the most suitable technical and economic solution based on RAIN RFID, Bluetooth and/or UWB RTLS.

**Development of a solution**

Once the specification and offer have been confirmed, the development phase begins. The first step is to create a detailed project plan with an overview of the necessary phases and milestones as well as the desired completion date. During development, the progress of the work carried out and the results are regularly reviewed. A special case is the development of customer-specific OEM RAIN RFID transponders, which are integrated into various end products. State-of-the-art EM simulation tools and measurement options are used to ensure that the antenna concepts and OEM RAIN RFID transponders function optimally.

**Approvals**

In addition to the development and production of customer-specific solutions, we can also take on all approval activities for you worldwide if required. We have a network of test laboratories on all continents, which enable us to issue certificates competently and promptly.

**System architecture**

A detailed system architecture is created for the selected concept solution, which includes the necessary electronic components. Project-specific antennas, hardware and embedded software are coordinated with you and defined in specifications. In this phase, the amount of our development effort is determined and a corresponding offer for the end product is prepared.

**Production from our own hands**

A major advantage of the solutions we develop is that we can also manufacture them directly for you. This not only guarantees a smooth transition from development to production, but also a very high quality of the products, which are 100% tested for their specified properties and requirements.

**After Sales Support**

As soon as the products have been delivered to the customer, we offer you comprehensive support options to ensure the constant availability of your system.

> **R&D services – Specific products and solutions**

**Readers/Nodes**

- HF/UHF RFID readers
- UWB/BLE node
- Concept development
- Customized integration
- Type approvals

**Antennas**

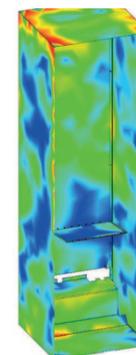
- UHF, HF antennas
- BLE, UWB antennas
- High gain and multi-polarization antenna
- Application-specific phased arrays
- Development in the range 13 MHz – 8 GHz

**Transponders**

- HF (NFC) and UHF transponders
- UWB, BLE transponders
- Robust IP67 solutions
- Virtual PoC and application safeguarding with 3D field simulations
- High-security windshield label and headlamp tags

**Software/Firmware**

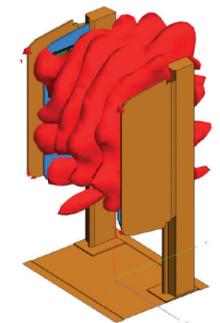
- Country profile development
- Customized firmware adaptations
- Application-specific read/write commands
- Real-time localization and direction detection



Passive UHF RFID



Ultra Wide Band RTLS



Model Axxess AG 2019

> **R&D: Order overview**

Order number	Name	Description
52010548	R&D hardware	Development of OEM RAIN RFID readers in accordance with customer requirements and specifications
52010549	R&D antenna	Development of OEM RAIN RFID antennas in accordance with customer requirements and specifications
52010550	R&D firmware	Development of specific firmware adaptations in accordance with customer requirements and specifications
52010654	R&D transponder	Development of OEM RAIN RFID special transponders in accordance with customer requirements and specifications



Anechoic chamber for automated transponder measurements and test areas for eKanBan and gate solutions

## > Cooperation with sparring partners

### IDePLATE – the label of tomorrow

The IDePLATE® imprinted aluminum RFID label is equipped with a forgery-proof, theft-proof data chip, making it an outstanding solution for the future. The IDePLATE® guarantees reliable and secure identification of vehicles in stationary and moving traffic, irrespective of traffic volume, weather conditions, vehicle model and speed.



### IDeSTIX – Efficient. Modern. Uncomplicated.

IDeSTIX is a high-quality security sticker with integrated RAIN RFID chip, which works according to the same principle as the IDePLATE. In combination with the electronic number plate, the protection against forgery is improved many times over. IDeSTIX® can be used as an alternative to the IDePLATE® RFID license plate, but can also be used in addition to it, which increases the security level even further.



### IDeSTIX Headlamp Tag – the electronic label for motorbikes

IDeSTIX is a high-quality security sticker with integrated RAIN RFID chip, which works according to the same principle as the IDePLATE. In combination with the electronic number plate, the protection against forgery is improved many times over. IDeSTIX® can be used as an alternative to the IDePLATE® RFID license plate, but can also be used in addition to it, which increases the security level even further.



## > Customized solutions with partners

### Axess – BLE-Ski Gate

Kathrein Solutions and Axess have jointly developed the advanced BLE Ski Gate. The AX500 Smart Gate NG BLE enables online ticket purchase and loading of the ticket into the user app. As soon as the skier is in the reading area of the gate, the cell phone connects automatically, the ticket is checked and the gate opens contactlessly. Kathrein Solutions' innovative antenna system enables precise position detection and maximum gate performance.



### Corratec – e-bike tracker „C-Finder“

The e-bike tracker (transponder) enables e-bikes to be localized via the Apple Find-My network. It is fully integrated in the motor cover area and is powered by the e-bike's battery during the normal charging process. This means that it can be used by the end customer throughout the entire life cycle of the bike. In addition, the so-called C-Finder also has its own battery, which ensures operation without recharging for up to one year.



### Tönnjes – IDeREADER InRoad

The IDeREADER InRoad is a special device for detecting vehicles in road traffic. It is embedded directly in the road, thus eliminating the need to install readers using cost-intensive gantries. The InRoad Reader has an integrated antenna with the option of switching in four directions and is therefore also suitable for direction detection. The complete InRoad Reader unit consists of the actual reader unit, an insert for vibration damping and the shaft housing.





KATHREIN Solutions GmbH  
Kronstaudener Weg 1  
83071 Stephanskirchen  
Germany

Phone +49 8036 90831 0  
Fax +49 8036 90831 69  
[www.kathrein-solutions.com](http://www.kathrein-solutions.com) | [info@kathrein-solutions.com](mailto:info@kathrein-solutions.com)

**KATHREIN**