PROFIsafe
open SAFETY
PROFIBUS
PROFINET

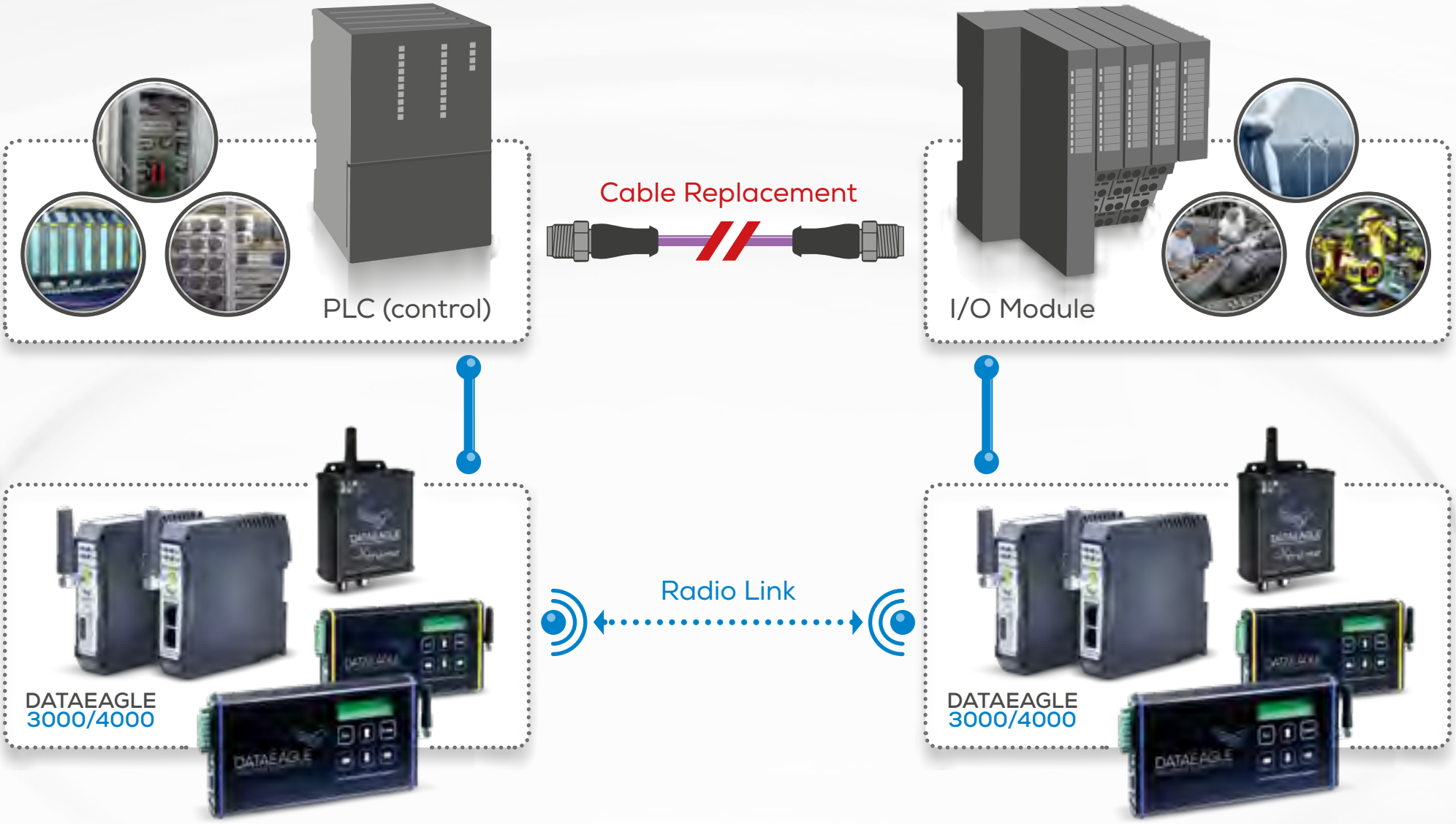
SCHILDKNECHT
SMART DATA COMMUNICATION

WIRELESS 101

RADIO DATA TRANSMISSION EXPLAINED

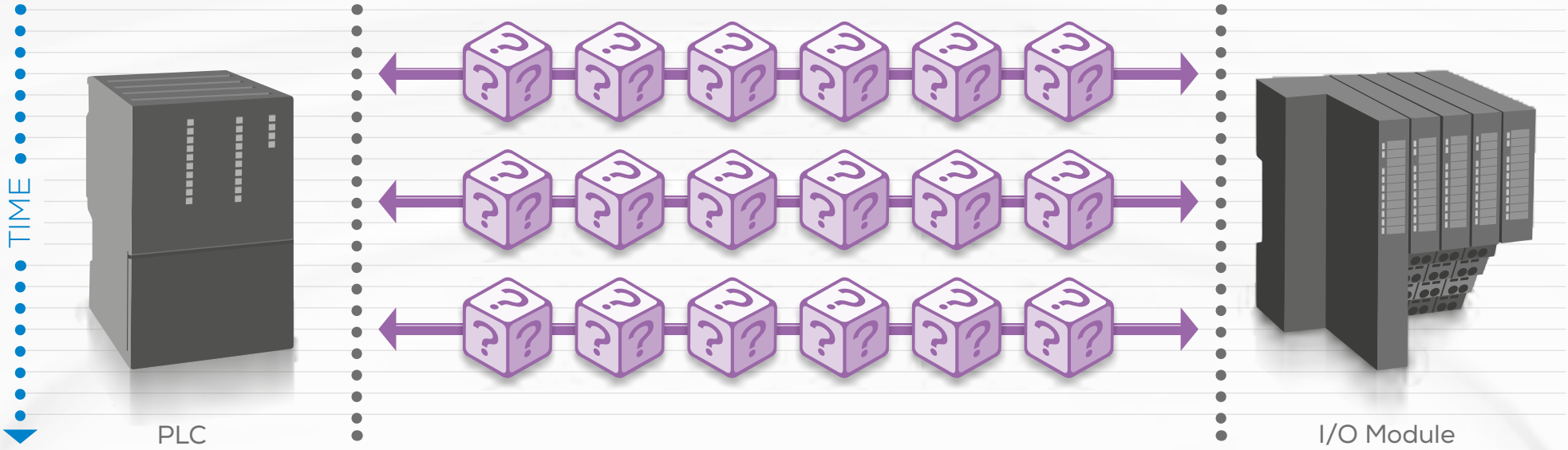
Radio instead of Cable

Robust Wireless Data Transmission



Cable Connection

Functional Principle



Conventional cable connection

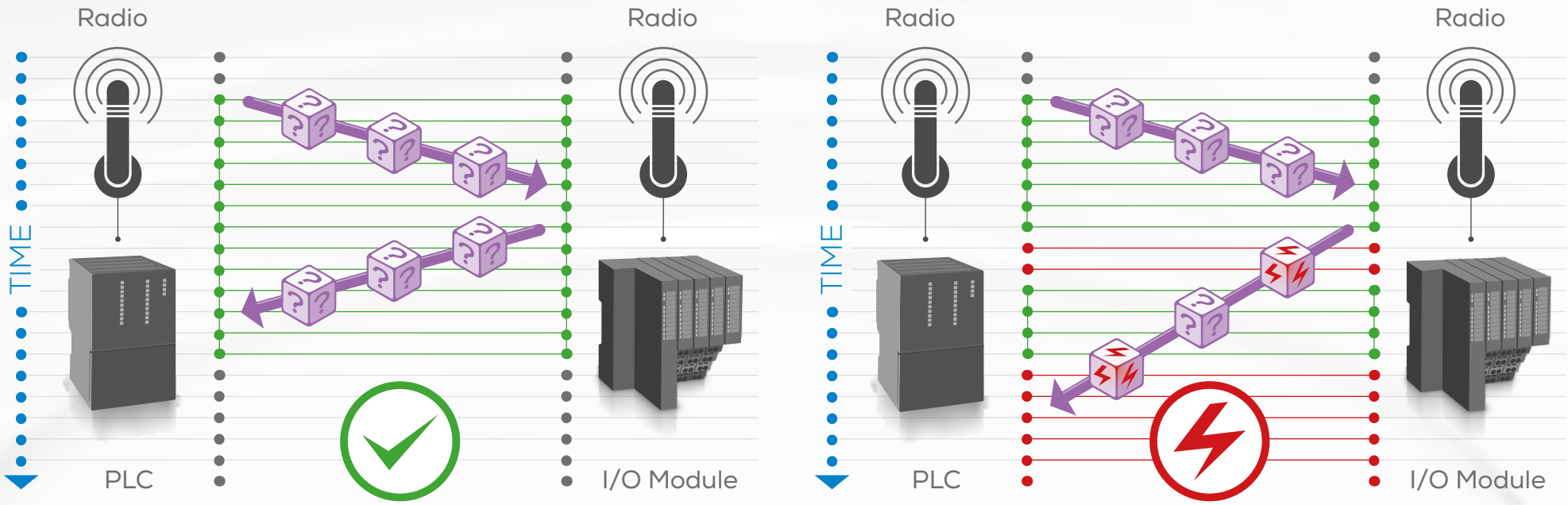
Data packages are sent between the PLC and the I/O Modules. Communications in a machine, between PLC, sensors and actuators is realized with standardized fieldbus systems such as PROFIBUS DP, PROFINET IO or CAN. Typically every millisecond telegrams are exchanged via the fieldbus.

How many meters cable?

Most of the times there is more than one I/O Module that is connected to the PLC in the machine. Furthermore, mobile machines place high demands on a cable connection or even make cabling impossible.

Radio Link

Data Transmission Principle



Response time via Radio – Within tolerance

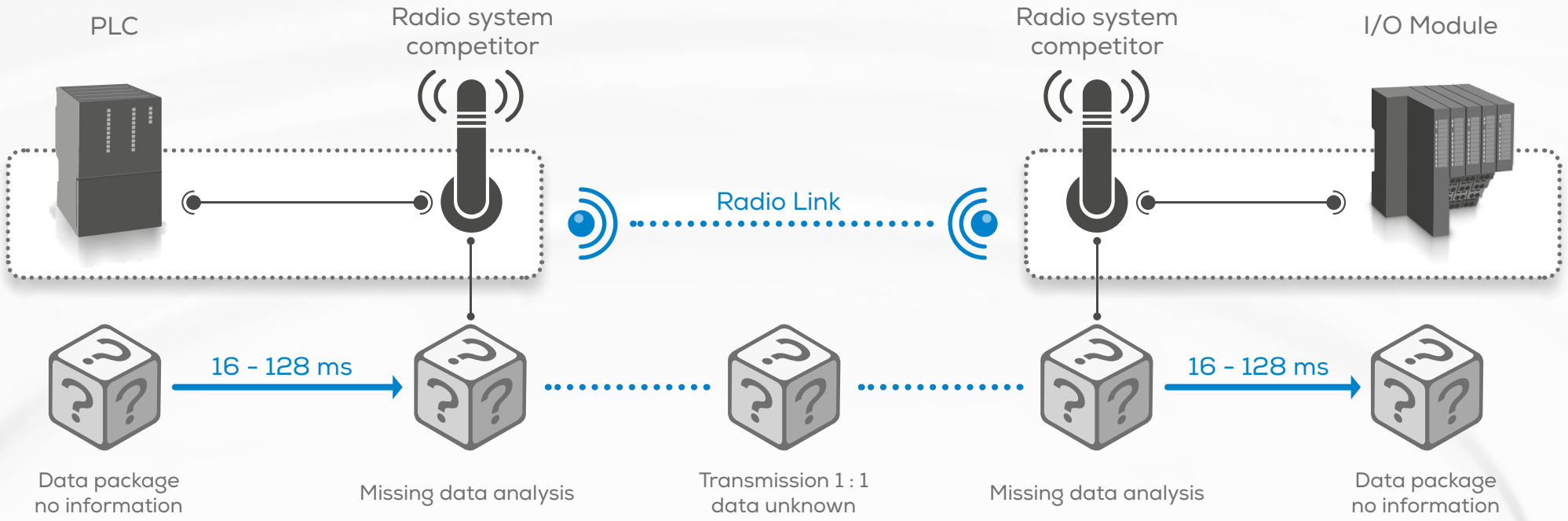
Fieldbus transmissions can be realized with a radio link using wireless standards such as WLAN or Bluetooth by replacing the cable with two radio modules. The pre-set response time, normally between 16 ms and 128 ms, must be maintained to operate smoothly and failure-free.

Response Time via Radio – Exceeding the Tolerance

If the response time is exceeded, e.g. caused by a radio interference from the environment, data packages will get lost and the PLC and I/O Module will head for bus-error condition. This can lead to lengthy machine downtimes and application halts, for example a cable car stopped for 2 to 3 hours.

Wireless Transmission without DATAEAGLE

Conventional Radio Systems without Data Pre-processing



1 : 1 Transmission of Data Packages

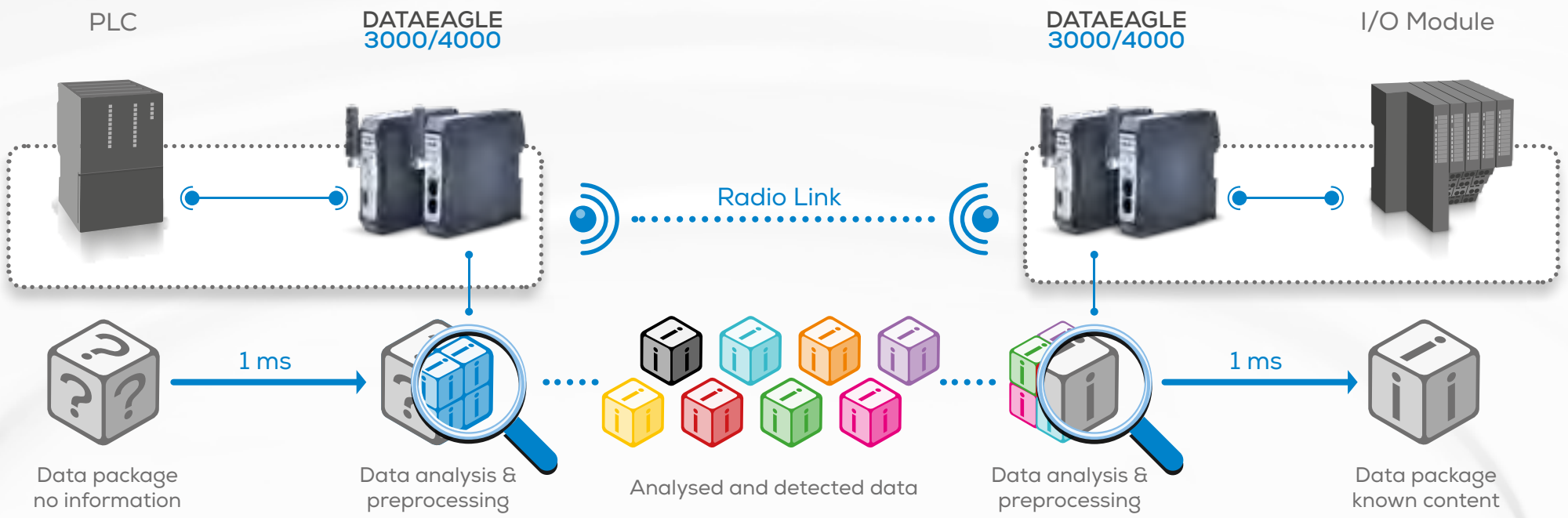
Conventional radio systems transmit data packages without preprocessing or analyzing the content. The consequence is that every data package must be transmitted. This easily leads to radio link overloads.

1 : 1 Processing of Data Packages

Lost, broken or delayed data packages, which are caused by overload or transmission interference, lead to fieldbus errors and machine down-times. The PLC is able to send new data packages every 16 – 128 ms and the I/O Module process at that pace.

Wireless Transmission with DATAEAGLE

Smart Radio



Data Transmission with DATAEAGLE

The smart radio system DATAEAGLE performs a preprocessing of the data in the module itself. Patented algorithms check the data content, time stamps and redundancy and parse the data into small information blocks and if necessary temporarily store them. The fieldbus interface and the wireless transmission timing are separated in order to obtain an error-free operation. Every millisecond a new data package can be processed.

Data Processing with DATAEAGLE

The aim of data pre-processing is to reach 100% availability of the machines and plants. Due to this process lost or broken telegrams are reconstructed, furthermore, delayed packages are replaced and validated. As a result, real-time capability is better than with conventional radio systems. Additionally, system failures caused by interferences can be prevented.

Smart Wireless

Your Advantages in Detail

Pre-Processing and Temporary Storage of Telegrams

The aim of pre-processing is to occupy the wireless channel as little as possible and to decouple the cable interface from the wireless medium. All PROFIBUS, PROFINET and openSAFETY/UDP telegrams, ordered according to the radio link's fieldbus participants, are temporarily stored in a database and content and attributes are analyzed. This pre-processing allows for high PROFIBUS data rates of up to 1,5 Mbit without altering the PROFIBUS configuration as well as using wireless transmission standards.

Setup and Monitoring of Filter Time

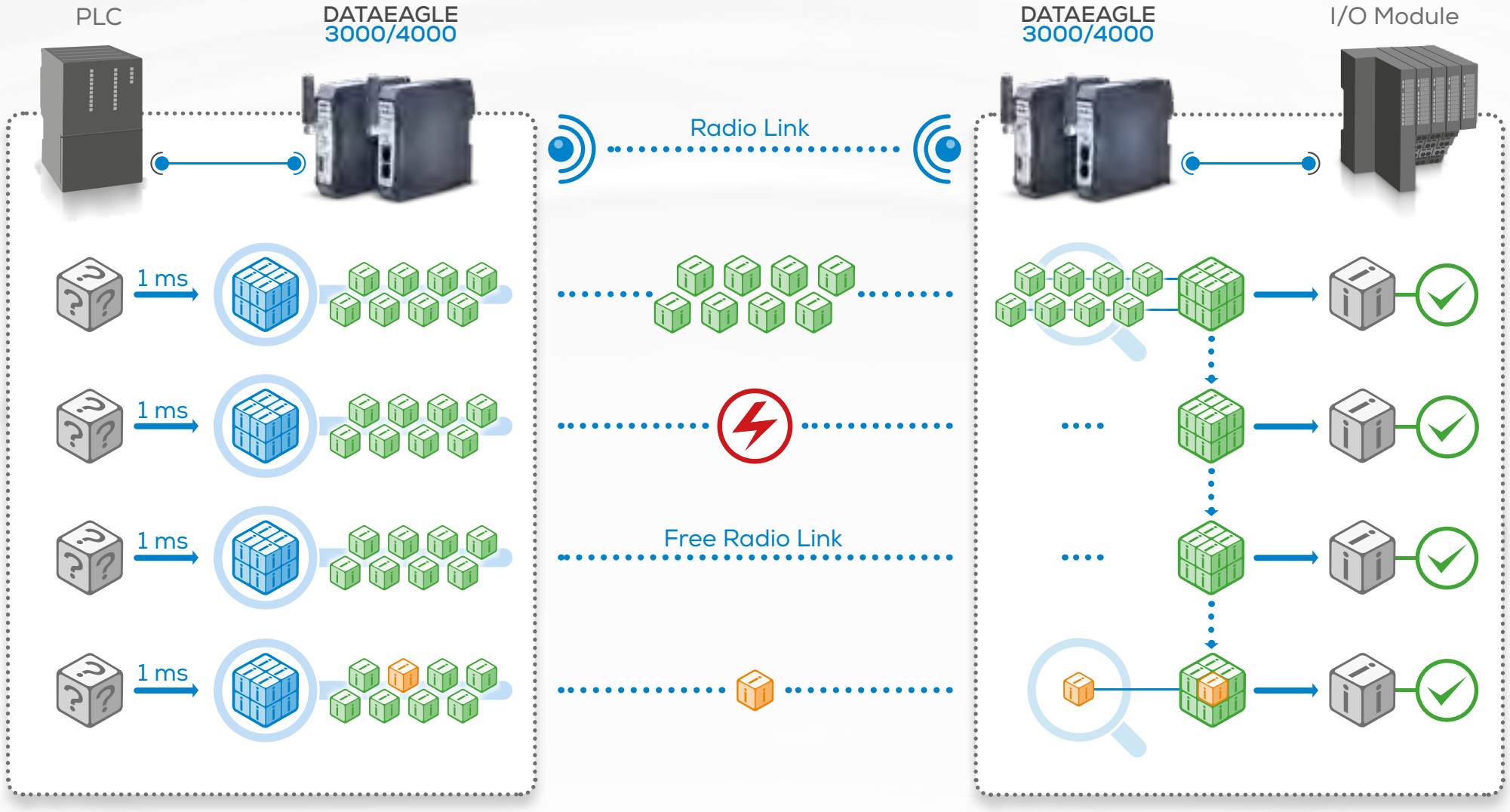
Within an adjustable filter time it is possible to maintain the PROFIBUS communication, even in the event of short transmission interferences. This helps avoiding bus errors and consequently system stops. Longer failures of the wireless connection, anyhow, are recognized and passed on to the PLC. In this case the control reacts as with a defective cable and activates all necessary safety functions. The filter time can be adjusted between 20 ms and 20 s.

Intelligent Firewall

The fieldbus master transfers cyclic data (cycle time less than 1ms at a PROFIBUS speed of 1,5 Mbit/s) to the slaves even though the content of the data packages stays the same. These PROFIBUS or PROFINET telegrams are recognized as such and filtered in order to reduce traffic on the radio link. Only changing telegrams are transmitted and sent over the radio link. Here, the actualization time after the radio link is about 20 ms.

Watch movie

Click me, scan me



Application Examples

Thousands of wireless systems have successfully been implemented. Please find more references on our homepage

New York – Roosevelt Island – The Cable Car operates safely

The installation equipped with a safety PLC should not cause disturbances at any time. The radio system DATAEAGLE 3702A was tested successfully and put in place in 2010. Since the terminal in Manhattan is located in E 60th Street but the cable car has to use the airspace above this street, it cannot run parallel but only in a very pointed angle to Queensboro Bridge. The space restrictions, interferences and the high demands regarding safety and regulations for elevators are a challenge for any radio link.

Scheffer Crane Technology – Automatic Mode Cranes in Galvanization Plant

Fieldbus technologies are commonly used to automate modern crane and lifting equipment. Radio links are used to control moving parts to replace conductor lines. DATAEAGLE 3000 allows application of wireless PROFIBUS. Galvanizing Plants are very highly automated, thus downtimes need to be avoided. To obtain this, Bluetooth was chosen as a very secure wireless technology. Radio link has worked for years without incident.

Stage Equipment for Helene Fischer – The birds flies smoothly in every show 'BREATHLESS'

Stage equipment demands a stable and secure radio link together with utmost safety standards for human interaction. DATAEAGLE 3702 wireless controls the bird on which Helene Fischer flies above the heads of the audience in her concerts. Because of the 80 meter long and curvy track a cable connection to the bird was impossible. Thanks to our patented technology the team of Schildknecht AG as well as the stage technology teams SWL and Fülling & Partner are not left breathlessly.

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