The SIMEDAKO Project

Secure WLAN communication for industrial field buses

In the past years, wireless communication systems have increasingly gained in importance. Besides the mobile radio systems of the different generations – which today span almost the entire globe – there is a growing trend towards licence-free communication methods in the near-field, which are clearly superior to mobile radio technology as regards their efficiency and properties.

Attention is thereby focused particularly on mobile systems that can be integrated dynamically into existing networks.

Due to their properties and – above all – due to the fact that their standardisation progress is already quite advanced, WLAN systems IEEE 802.11 (Wireless Local Area Network) have been able to establish themselves on the market. Thanks to a considerable cutdown on prices for WLAN products – in comparison to previous years – and components that fulfil the extended requirements in the industrial sector, it is now possible to use WLAN communication solutions also in the industrial environment. Where, for example, cables are obstructive or new connections by means of cables are too cost-intensive, wireless technologies are the obvious choice. In the PC environment, including the periphery devices, use of WLAN technology is already state of the art.

Where special technical requirements are placed on communication and data security, it is necessary to integrate additionally interface support and securing procedures into the higher communication protocols. This is especially the case when, together with the other data, data have to be transmitted which are subject to mandatory verification or worthy of protection.

A further field of application for WLAN solutions derives from the requirement that direct access to serial field buses be given via the Internet. This means that the remote diagnosis and remote maintenance of communication islands – which so far had been isolated – become possible. Thanks to WLAN technologies, the possibility of establishing a connection to mobile field bus components via the Internet should, in particular, open up interesting new fields of business.

Although in the consumer sector the prices of WLAN components are already quite favourable, such systems have so far been available for use in the industrial sector only to a limited degree and at high prices.

This is the reason why the SIMEDAKO (Secure Wireless Communication of Measurement Data) research project has been launched. Its aim is to make available suitable WLAN components which have special properties. This project, which has been running since October 2003 and is planned to run for three years, is supported with funds from the Federal Ministry of Economics and Technology and is carried out together with Ratio Elektronik GmbH and Dezidata GmbH as partners from industry.

Establishing a connection to the WLAN field bus

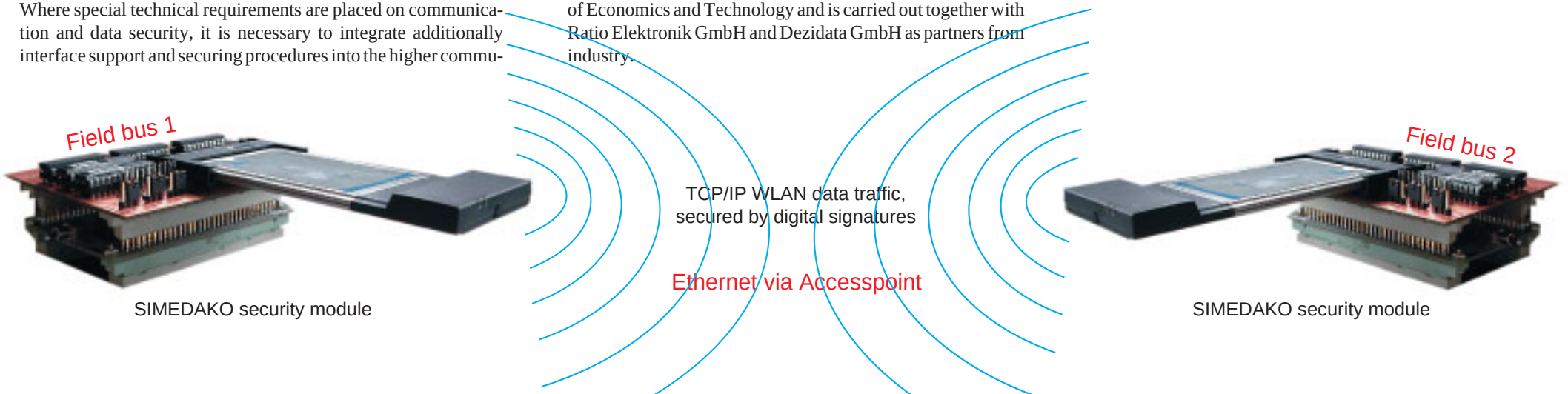
Wireless-LAN for the Measurement bus as a wireless extension for the European Petrol Station Interface

The SIMEDAKO radio components are specially designed to transmit sensitive data securely within the industrial environment. Particularly supported are the communication of measurement data conforming to the Measurement bus (e.g. the European Petrol Station Interface) and the communication via Ethernet and WLAN with TCP/IP protocols.

Apart from extending the field bus by a wireless communication line, it becomes possible – thanks to the use of TCP/IP protocols – to establish a connection to new components and applications in field bus segments which had previously been separated from the Ethernet.

Potential fields of application are, for example, vehicles and terminals (especially for vehicle/vehicle-communication), petrol station equipment (e.g. auto fuel terminals, where simultaneously, data subject to mandatory verification have to be taken into account), and mobile and stationary measuring systems with secured data transmission (e.g. weighing instruments).

Apart from this, the range of applications for SIMEDAKO radio components extends over the whole spectrum of measurement data transmission.



Secured and open data transmission

Advanced signatures secure the WLAN TCP/IP data traffic

The SIMEDAKO security concept specifies security requirements for transmitting field bus data via the radio and/or Ethernet connection, especially data traffic under verification law and data traffic with connection to the WAN. The security concept lays down in which way the datasets to be transmitted are to be identified and encoded – by means of adequate procedures – according to their origin and in relation to their integrity.

To secure the measurement data, cryptographic securing methods are applied. Thereby, digital signatures, generated by asymmetric cryptography methods, are used. The measuring values are signed directly in the SIMEDAKO modules. Fig. 1 shows a first conversion.

Due to the possibility of checking the signature at all times by means of the supplied measuring data, data manipulation is ruled out (guarantee of data integrity) and the origin of the measuring values can be clearly identified (guarantee of data authenticity). It is thus possible to subject signed measuring values to an independent check for data integrity and data authenticity. Processing of the data is also possible without checking of the signature.

SIMEDAKO security module

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The SIMEDAKO Project

Compact components and open methods for the industrial exchange – via WLAN and Ethernet – of data relevant under verification law

The SIMEDAKO research project is focused on the development of communication concepts for the secure transmission of radio data and their validation, as well as on the development of suitable communication components. For validations and examinations, a quality assurance system, consisting of test tools and test facilities, is being developed.

One focal point in the graded security concept is the secured end-to-end data transmission. The requirement for a secure, traceable exchange of data, also beyond the borders of a field bus system, requires the use of security procedures for the authentification of measuring data, the ensuring of access security and the certification of software. Besides this security architecture, also the security concepts known from the Internet and from the WLAN standard are applied. Attention is focused on applications in the fields of metrology and automation engineering, on applications in mobile facilities and in zones difficult to access, and on applications with sensitive data traffic in the industrial environment.

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Secure Wireless Communication of Measurement Data

SIMEDAKO

Sichere drahtlose
Mess-
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