



ALL-IN-ONE CARDS: the problem of achieving 100 percent performance

How can different smart card systems work together in one medium without interference whilst simultaneously offering high performance?

Custom-made smart card geometry with original chips, automated in-house production made in Germany: smart card and key fob manufacturer AEG Identifikationssysteme develops and produces customer-specific smart cards and key fobs for end users and system integrators at its site in Ulm. With solutions for access, time recording, payment, vending machines, and employee registration, the company offers high-performance card products for all economic sectors, from industry to logistics to medicine. In an interview with "RFID & Wireless IoT Global", Simon Arch, AEG Identifikationssysteme, speaks about the importance and the future of smart cards, and explains how the company removed fluctuations in card performance.

Simon Arch, Marketing & Sales Director, AEG Identifikationssysteme, in an interview with "RFID & Wireless IoT Global"

Multifunctionality yes, 100 percent performance no?

Whether it is time recording, access control, or payment: different applications on one compact smart card have long been a standard for end users and system integrators. Having several parallel systems and multiple cards per employee is costly and confusing. Companies and employees benefit from an all-in-one card which transparently combines all internal systems and functions. However, almost all users of combination systems face the same major challenge: fluctuations in card performance. The individual components of the hardware, such as readers, antennas, or locking cylinders, work with different reading ranges and process windows due to different requirements. A locking cylinder with a small coil for an access solution

has a different range than a reader mounted to the wall with a large antenna and power supply for payment or identification solutions – regardless of whether one or several hardware providers are involved and whether old or new systems are installed.

Matching components?

20 years ago, when the first time recording systems with RFID cards came onto the market – for example in skiing areas or for parking solutions – the individual hardware components were optimised for one single application. Later, solutions were added for access, payment, or access to drinks machines using a smart card, for example, – all with different requirements regarding reading range, card geometry, or frequency tolerance. The required infrastructure was not redesigned from scratch or optimised for newly added solutions, but was simply supplemented. In many cases, components from different hardware providers were installed without mutually adapting them. Newly installed overall systems from a single provider record fluctuations in card performance as well, due to the different scopes of their tasks.

Optimisation for just one application

"The individual integrated hardware components rarely match, resulting in fluctuations in card performance. Often readers come from manufacturer A while the chips come from manufacturer B. Identification systems that were installed years ago are supplemented with components from another supplier. The printer used is not optimised for the coil geometry of the card. Card and reader frequencies do not match. Thus, the card cannot be read at 100 percent. Integrators may agree with their suppliers on a common standard, however, it may be inappropriate for the end user due to specific requirements on site. If several functions and reading ranges are to be combined in

one card, end users and system integrators have to decide for which application the performance is optimised. Where do they compromise regarding performance?" Simon Arch, Marketing & Sales Director, AEG Identifikationssysteme, says.

The end of the smart card?

Do these challenges mean that the end of the smart card is imminent? Simon Arch answers with a clear no: "Traditional employee IDs with an image have not yet outlived their purpose in the commercial area, despite fluctuations in performance. The importance of the smart card will even be enhanced by new applications. In the medical field, or in logistics and production, employee IDs with RFID enable the issuance and verification of access rights aside from classical recording. In the area of tool issuing, they ensure that only authorised employees are issued specific tools. In sensitive areas such as hospitals, RFID ID cards enable comprehensive tracking of all processes, for example, which procedure has been carried out by which employee for which patient. The number of possible smart card applications is continuously expanding, due to new requirements in different industries."

Smart card with image function

However, access or payment solutions are not limited to the smart card. Applications such as personal access rights could alternatively be handled easily via the NFC function of smartphones. What benefits make smart cards the first choice? "Employee ID cards have the advantage of visual identification. Many companies control access to their premises with a guard. Replacing existing card identification systems with company mobile phones for every employee for the sake of simple access control is too expensive. Unlike private applications like contactless payment or car rentals via smartphone, companies are bound by strict data protection regulations. In sensitive high-security areas, Cloud applications pose a security risk. To be able to protect employee data 100 percent, companies need an internal closed identification system. Smart card and key fob solutions offer exactly that," Simon Arch emphasises.

Customer-specific engineering

AEG Identifikationssysteme wants to solve fluctuations in card performance with a new card geometry for smart cards and key fobs. "The company offers customer-specific engineering to both end users and system integrators. In cooperation with the customer, all card components are matched according to their respective requirements and are optimised for all end-user applications. AEG Identifikationssysteme optimises the coil geometry, the frequency, the size, the positioning, and the distance of the coils when there is more than one frequency. The frequency tolerance as well as the positioning of the tolerance is specifically tailored to the reader system of the client. The narrow frequency tolerance is suitable for hybrid cards during a migration process from one frequency to another,

The company offers customers personalised key fobs with 3D company logos as part of its customer-specific engineering portfolio.

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Simon Arch, Marketing & Sales Director, AEG Identifikationssysteme



such as from HF to UHF. The company can include both low and high frequencies, high and ultra high frequencies, as well as two high frequencies with chips from different providers on one card," Simon Arch explains.

High-performance smart cards in one tag

The company produces all card components in-house – from original chips to inlays to the personalised card – at fully automated plants in Ulm. The quality of the cards is verified by the smart card manufacturer during production in up to seven test steps, regarding function, frequency, reading range, positioning, and compatibility. Spectrum analysers and other test equipment monitor every production step, from chip to transponder and prelam to the finished card. This is followed by a visual control. Simon Arch says: "Thanks to in-house production, the company is able to define the card geometry together with the customer, print prototype cards, test them for quality and compatibility with the readers of the customer during production, and then proceed to mass production after completing the test phase, all within one day. Optional card features such as a print image with personalised logo or key fobs with 3D logos can also be realised. Aside from employee ID cards for registration for operating plants and machines, there is currently a high demand for personalised products."

