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METHOD FOR THE OPERATION OF CONTACT-LESS IDENTIFICATION MEDIA

The invention is related to a method for the operation of contact-less identification media in a system with contact applications for contact cards , a converter module and an installation. Contact card systems with contact identification media are widely utilised and are known for various applications, e.g., as access cards for certain zones within a company, for time management, as access media for the use of devices, e.g., data facilities, as credit cards and also as check or value cards for obtaining services of the most diverse kind.

Increasingly there is the requirement, resp., the demand to also be in a position to utilise contact-less identification media in such systems, in order to be able to exploit their great advantages above all with respect to handling as well as with regard to possible extensions of applications.

For this purpose up until the present moment a contact-less RF - application with RF - reading stations for contact-less communication had to be integrated into the system. This calls for a communication interface to the existing contact system in the host and to local control devices of the contact applications at the read/write stations, the specific commands of the RF - reading stations have to be programmed, and the physical integration of the RF - system, including power supply terminals, has to be implemented.

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With this, the effort and expenditure for additional RF - reading stations of this kind becomes relatively great and correspondingly expensive.

Another possibility for the introduction of contact-less identification media consists of the utilisation of hybrid media, which contain both communication types. Here in principle a contact card for a contact communication system is integrated into a card in the format of the contact card with a contact-less identification system for contact-less communication. Hybrid cards of this kind with a dual function, however are sophisticated and relatively expensive and the problem of the servicing and maintenance of two different systems in the host still remains.

Embodiments of the present invention seek to create a much simpler and cheaper complement for contact card systems with contact-less identification media and to indicate methods and devices, which with much less effort and expenditure make the utilisation of contact-less identification media in such a system possible and which also enable a step-by-step transformation into a contact-less system.

According to a first aspect of the invention, there is provided a method for the operation of contact-less identification media in a system with a contact application for contact cards, characterised in that an initialised converter module is connected in series, which on the one hand carries out a contact-less communication with initialised contact-less identification media and on the other hand carries out a contact communication at a contact card interface to a host computer or to an application computer of a contact read/write station for the communication with a contact application of the system and which with respect to communication rules and information translates the contact-less communication into a contact communication with contact information and vice versa.

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According to a second aspect of the invention, there is provided a converter module for the contact-less communication with initialised contact-less identification media in a system with a contact card application and with contact communication rules, characterised in that the converter module is initialised and

- on the one hand comprises a part, which carries out a contact communication at a contact card interface to a host computer or to an application computer of a contact read/write station
- on the other hand comprises a part, which carries out the contact-less communication to the contact-less identification media
- and comprises a part as translation part, which translates the contact-less communication into the contact communication.

According to a third aspect of the invention, there is provided an installation with a host, a contact interface, contact read/write stations and contact identification media, characterised in that initialised converter modules are provided for the contact-less communication with additional initialised contact-less identification media, wherein the converter modules on the one hand carry out a contact communication to the interface of the contact system and on the other hand carry out a contact-less communication to the contact-less identification media and which translate the contact-less communication into the contact communication, and vice versa.

With the initialised converter module the communication with the initialised contact-less identification media is transformed, resp., translated into a contact communication, which at the interface to the host computer precisely corresponds to the contact communication and - information of the system up until now, i.e., at the interface S for the system an identical communication as with the contact cards

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appears. With this, the contact reading devices and the interface to the host also for contact-less identification media receive exactly the same communication as for contact cards, i.e., on the side of the existing system with host, contact application, contact reading devices and contact operating systems. No modifications are necessary. The contact card operating system here in principle is integrated into the converter module.

In the following, the invention is further explained on the basis of Figures and examples. These illustrate:

- Fig. 1a a system with host, contact card read/write station, contact cards and interface in between with corresponding contact communication,
- Fig. 2a a complement in accordance with the invention with an initialised converter module for the communication with initialised contact-less identification media on the one hand and with a contact card read/write station on the other hand,
- Fig. 3a an initialised read/write station with a converter module for the communication with contact-less identification media and with a contact interface to the host,
- Fig. 4a a system with a read/write station for the communication with contact applications as well as with contact-less applications in contact-less identification media,
- Fig. 1b-4b variants with an integrated applications computer in the reading stations and with a temporary connection to the host,
- Fig. 5a the structure of a converter module with an RF - transmitter / receiver as a plug-in module into a contact card read/write station,

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Fig. 5b the structure of a contact-less read/write station with integrated converter module and an applications computer as well as with an additional contact-less communication for contact-less applications,

- Fig. 6 an assigned contact-less identification medium with several independent applications,
- Fig. 7 variants of the origin of contact applications for registration into contact-less identification media,
- 5 Fig. 8 an authorisation read/write station for the registration of contact applications by means of a contact-less authorisation medium,
- Fig. 9 an authorisation read/write station for the registration of contact applications by means of a contact authorisation medium,
- Fig. 10 an authorisation read/write station for the registration of contact applications by means of a built-in authorisation element,
- 10 Fig. 11 a converter module, which is integrated into an applications computer,
- Fig. 12a-c various possibilities for the initialisation of converter modules, resp., of read/write stations with converter module,
- 15 Fig. 13 initialisations of contact-less identification media, converter modules, plug-in modules and read/write stations in general, as well as with the framework of authorisation – and sub-authorisation systems,
- Fig. 14 an installation with contact applications, contact card
- 20 communication, contact media, converter modules and contact-less identification media as well as with additional contact-less applications, contact-less communication and contact-less reading stations.
- 25 The Figures 1a – 3a illustrate the method in accordance with the invention for the operation of initialised contact-less identification media RF-IM in a contact card system by means of an initialised converter module C-RF for the translation of the contact-less communication K-RF with the identification medium into the contact communication K-C of the contact card system.

- Fig. 1a depicts a contact card system of the familiar kind with contact card read/write stations C-WR and assigned contact identification media C-IM as application media, both of which comprise contacts 6 as well as with a contact card interface S and a
- 5 connection to a host computer H, which contains contact applications C-App. From the contact medium C-IM through the reading station C-WR up to the host H, resp., to an application in an application computer App-uP (Fig. 1b), the communication takes place as contact communication K-C with contact information I-C.
- 10 In order in such existing contact systems with contact cards C-IM additionally and alternatively also be in a position to utilise contact-less identification media RF-IM as application media with all their well known advantages and extended application possibilities, in accordance with the invention (according to Figures 2a, 3a) an initialised converter module C-RF is interposed in series,
- 15 which on the one hand carries out an RF - communication K-RF with initialised contact-less identification media RF-IM and on the other hand implements a contact communication K-C at a contact card interface S to a host computer H or to an application computer App-uP of a contact read/write station C-WR for the communication with a contact application C-App of
- 20 the system and which translates the contact-less communication K-RF with respect to communication rules and information I-RF into a contact communication K-C with contact information I-C and vice versa.
- With this, the contact card operating system in principle (at least partially) is
- 25 integrated into the converter module.

A variant embodiment of this is illustrated in Fig. 2a, wherein here the converter module C-RF is implemented as an initialised (Ini) plug-in module C-RF-Plug with contacts 6. This plug-in module is capable of being plugged into an existing

read/write station and is simultaneously designed as a contact-less read/write station for the communication with initialised (Ini) contact-less identification media RF-IM. The contact takes place through the contacts 6 of the contact reading station C-WR and of the plug-in module C-RF-Plug. In the plugged-in condition, the plug-in
5 module and the contact reading station together form an initialised contact-less read/write station C-RF-WR. With this, for carrying out a contact application C-App the corresponding contact communication K-C and - information I-C is translated by the converter module C-RF into the contact-less RF - language: C-App in RF(C-App) and transmitted to the contact-less identification media RF-IM as a contact-less
10 communication K-RF, I-RF.

During the trail – or step-by-step introduction of additional contact-less identification media RF-IM, already existing contact card read/write stations C-WR with plug-in modules C-RF-Plug may as required be utilised both for contact card C-IM as well as
15 for contact-less media RF-IM. For example, in a shopping centre with several cash register terminals, which are equipped with contact card reading stations C-WR, for the step-by-step introduction of contact-less identification media individual cash register terminals may be retrofitted by means of the plug-in modules C-RF-Plug, i.e., the more purchasers want to pay with contact-less identification media, the more
20 correspondingly retrofitted contact-less read/write stations may be made available in a simple manner.

The initialised plug-in module C-RF-Plug may also be implemented in two parts with a first part, which is completely introduced into a contact card read/write station
25 C-WR and a second part, which is affixed to the outside of the reading station C-WR and which carries out the communication K-RF with the contact-less identification media RF-IM.

Fig. 3a as a further variant illustrates a converter module C-RF, which by means of connections 7 is directly connected to the interface S with the contact communication K-C, I-C and which together with an integrated RF – transmitter / receiver forms an initialised (Ini) contact-less read/write station C-RF-WR. The design of the converter module C-RF and of the contact-less read/write station C-RF-WR is further
 5 explained in connection with Fig. 5.

The initialisation Ini for the generation of the compatibility of contact system C and contact-less system RF has to be implemented on the identification media RF-IM and
 10 at the RF – reading stations, i.e., on the converter module C-RF itself or else at the read/write stations C-RF-WR formed together with it or on the plug-in modules C-RF-Plug. This initialisation is explained in further detail in connection with the Figures Fig. 12 and 13.

15 Figures 1b – 3b illustrate analogue examples to the Figures 1a – 3a, wherein, however, here an application computer App-uP is assigned to the C-RF for the execution of an application C-App independent of a direct on-line connection to a host H and for the execution of decentralised local functions of an application C-App
 - at a station with an initialised plug-in module C-RF-Plug in accordance with Fig.
 20 2b,
 - or at an initialised contact-less read/write station C-RF-WR in accordance with Fig. 3b.

Fig. 4a illustrates a converter module C-RF in a contact-less read/write station C-RF-
 25 WR, which comprises additional means for contact-less communication K-RF, I-RF with contact-less applications RF-App at an interface S(RF), e.g., to a host H with contact-less applications RF-App. If so required, the converter module C-RF is also capable of processing several types of contact communications (with different contact operating systems), here, e.g., two types of contact communication K-C1 and

K-C2. For this purpose, the converter module C-RF here also comprises means KW for the selection of the type of communication between different contact communications K-C1, K-C2 and contact-less communication K-RF . With the means of selection KW it is assured, that the correctly required type of
5 communication in both directions, i.e., from the host to the identification medium RF-IM as well as from the identification medium to the host, resp., to the application is selected, translated and transmitted. Different types of RF - communication K-RF1, K-RF2 are also possible.

In doing so, the selection of the type of communication may take place automatically
10 in correspondence with the type of application (C1-App, C2-App, RF1-App, RF2-App) or else it may also be settable.

The selection of the type of communication may take place in correspondence with a request from the side of the host H or from the application computer App-uP and on the other hand it may also take place in correspondence with a request from the side
15 of the identification medium RF-IM.

Different operating systems K-C1, K-C2 may, e.g., be utilised by different providers of check – or value – or credit cards (of Bank1, Bank2, post) or also of companies for proprietary company applications (access, IT - access, canteen etc.).

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The example of Fig. 4a illustrates the three types of communication K-C1, K-C2, K-RF with corresponding applications C1-App, C2-App and RF-App in a host H. The means of selection KW here ensures, that the contact applications C1-App, C2-App with the contact communication types K-C1, K-C2 are translated into the RF –
25 language and are transmitted to the contact-less identification medium RF-IM in RF - communication as RF(C1-App), resp., RF(C2-App) and vice versa. A contact-less application RF-App with contact-less communication K-RF and I-RF at an interface S(RF) to a host in contrast does not require any translation. There for the execution

of an RF – application the contact-less communication K-RF, I-RF is directly passed on in both directions by the communication selection means KW.

Advantageously contact systems make use of standardised types of communication.

- 5 In doing so, the converter module C-RF is driven from a contact application C-App from an assigned host H or an application computer App-uP according to the rules and protocols of a standardised contact communication K-C with standardised contact information I-C and the converter module C-RF responds to the contact application C-App in accordance with the same rules and protocols.

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The converter module C-RF may be driven and may respond according to standardisation protocols in accordance with national or international organisations such as ISO, IEC, IEEE, ANSI, CEN or CENELEC.

- 15 Fig. 4b illustrates an example with an application computer App-uP in the contact-less read/write station C-RF-WR with a temporary connection to a host H, wherein the applications of the application computer App-uP are capable of being carried out decentralised, i.e., independent of the host H. This example comprises a type of contact communication K-C with several applications C-App1, C-App2 and a type of
- 20 RF - communication K-RF with several applications RF-App1, RF-App2, RF-App3. The means of selection KW here therefore differentiates between the communication types K-C and K-RF.

- The Figures 5a and 5b illustrate the structure of a converter module C-RF in
- 25 accordance with the invention. The converter module comprises three parts:
- on the one hand a part 1, which carries out a contact communications K-C, I-C at a contact card interface S to a host computer H or to an application computer App-uP of a read/write station C-WR,
 - on the other hand a part 3, which carries out the contact-less communication K-RF,

I-RF to the contact-less identification media RF-IM,

- and comprises a part 2 as translation part C/RF, which translates the contact-less communication K-RF, I-RF into the contact communication K-C, I-C.

For the implementation of the contact-less communication K-RF with the contact-less identification media RF-IM the converter module C-RF also comprises an RF –
 5 transmitter / receiver 4 with an antenna 5.

The example of Fig. 5a depicts a converter module C-RF in a plug-in module C-RF-Plug with contacts 6, adapted to a desired contact read/write station C-WR.

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The example of Fig. 5b illustrates a converter module C-RF in a contact-less read/write station C-RF-WR with an integrated application computer App-uP as well as, for example, with two types of contact communication K-C1, K-C2 as well as with an RF - communication K-RF for corresponding applications.

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The converter module C-RF with the parts 1 = C communication part, 2 = C/RF translation part and 3 = RF communication part does not have to be implemented as a functional component. These parts 1, 2, 3 may also be implemented as separate components, if so required comprising several sub-components. For example, the
 20 part 3 or also the parts 3 and 4 may form a component. In doing so, the part 3 may also process initialisation information Ini-I, Ini-A-I, resp., contain it and with this ensure the compliance with the initialisation standards and the rules of the authorisation system A (refer to Figures 12 and 13).

25 Fig. 6 illustrates an assigned contact-less identification medium RF-IM, which in its memory contains several independent applications. Here, for example, two types of contact communications K-C1, K-C2 with contact applications in RF - language RF(C1-App1), RF(C1-App2) and RF(C2-App1) as well as the contact-less applications: RF-App1, RF-App2, RF-App3 in RF - communication K-RF.

For safeguarding the contact-less communication K-RF with the transmitted information I-RF between the converter module C-RF and the contact-less identification media RF-IM, in preference an encryption cryp of the communication
5 K-RF is implemented.

For writing processes in case of the contact-less communication K-RF from the converter module C-RF to the contact-less identification media RF-IM in preference a shadow memory shad is utilised in the identification media and on the converter
10 module – as is illustrated in the Figures 5 and 6.

The encryption cryp serves for safeguarding against unauthorised monitoring and unauthorised intervention by third parties. With the shadow memory shad it is assured, that a writing process is carried out completely and correctly (or not at all)
15 and that, e.g., in case of an interruption of the communication no data loss or errors are produced. These methods are described, e.g., in the WO 97/34265.

The Figures 4a and 5a depict contact-less read/write stations with an energy store 9 and a power amplifier 10, which are assigned to the converter module C-RF. This
20 makes higher transmission powers possible and also enables the decentralised, autonomous operation of contact-less read/write stations. In Fig. 5a the power supply 8 of the plug-in module C-RF-Plug in preference is implemented through the contacts 6 to the contact card reading station C-WR. In doing so, frequently only a relatively low power is able to be drawn. For the communication with the contact-
25 less identification media RF-IM and the execution of an application, however, a higher power may be necessary or desirable. For this purpose the energy store 9 is provided, which during the transmission breaks continually collects energy. With a power amplifier 10 the required higher transmission power for the contact-less communication and for the execution of applications is able to be produced.

The converter module, resp., the read/write station may also include means for autonomous power supply, such as batteries or solar cells. With this, e.g., a decentralised station, which includes an application computer App-uP with an application, such as, e.g., in Fig. 4b, is also able to be operated offline. In this, local functions may be contained in the applications computer and basic functions in the host.

For the execution of applications corresponding dialogue devices 11 may be assigned to the converter modules C-RF, resp., to the contact-less read/write stations, as is illustrated in Figures 4a and 5a, e.g., a display 12, an input keyboard 13, biometric sensors and identification elements 14 and also PIN - codes 15 for access authorisations. The example of Fig. 5a depicts a plug-in module C-RF-Plug with dialogue devices 11. These dialogue devices and the assigned applications may also extend beyond the functions of the contact card read/write stations C-WR, into which this plug-in module is plugged, i.e., also new and extended functions, resp., dialogue devices are possible.

With the Figures Fig. 7 – 10, the registration, resp., initialisation of new, changed or extended contact applications C-App in contact-less identification media RF-IM is illustrated. For this registration an authorising read/write station A-C-RF-WR (resp., an initialising read/write station) with a converter module, an authorisation element AE as well as with authorisation information A-I are employed. The rules for the registration, resp., initialisation of new applications and new identification media are defined in an authorisation system (described in conjunction with figures 13, 14). Fig. 7 illustrates the possible origin of such new applications for registration in the contact-less identification media RF-IM. These new applications C-App may, e.g., be stored in a contact identification medium C-IM, in a host H or also in an application computer App-uP.

Figures 8 – 10 illustrate possible variant of embodiments for the registration, resp., initialisation of new applications. In accordance with the example of Fig. 8, the authorisation information A-I are contained in a mobile, contact-less authorisation medium A-RF-IM and from there are transferred to an authorisation element AE-RF of the authorisation read/write station A-C-RF-WR. By means of this authorisation information A-I and the authorisation element AE subsequently a new contact application C-App is translated into the contact-less communication K-RF, I-RF in the converter module C-RF and registered in the contact-less identification medium RF-IM as a translated contact application RF(C-App).

Fig. 9 depicts an example, in the case of which the authorisation information A-I are transferred into an authorisation element AE-C of the authorisation read/write station A-C-RF-WR by means of a mobile contact authorisation medium A-C-IM.

Fig. 10 illustrates a further variant, in the case of which an authorisation element AE, which contains the authorisation information A-I, is built into, resp., integrated in the authorisation read/write station A-C-RF-WR. Fig. 10 also depicts a further variant, in the case of which the authorisation information A-I are transferred to the authorisation read/write station A-C-RF-WR through a network N. It may also be transferred through a secure private or with the corresponding encryption also through a public network N.

As these different possibilities manifest, depending on the requirements and the application a particularly suitable variant may be selected for the initialisation, resp., for the registration of new applications. Of course also combinations of these are conceivable, e.g., that a part of the authorisation information A-I is fed-in through a network N from a central station, while the remainder of the authorisation information, e.g., is fed-in locally with an authorisation medium.

Fig. 11 as a further particularly efficient embodiment of the invention illustrates a contact-less read/write station C-RF-WR with an application computer, wherein here the converter module C-RF is integrated into the application computer App-uP, this
5 instead of two necessary separate computing chips. This makes a particularly cheap, efficient and space-saving manufacture possible. In this, the application computer is also capable of containing applications C-App.

Regarding Fig. 12: With the initialisation of contact-less identification media RF-IM
10 and of the reading stations C-RF-WR C-RF-Plug, the compatibility of the contact system C and the contact-less system RF is established.

Figures 12a, b, c illustrate various possibilities for the initialisation of reading stations C-RF-WR and plug-in modules C-RF-Plug, resp., of converter modules C-
15 RF. In this, the initialisation may be contained in the converter module C-RF itself or in the complete reading station C-RF-WR, C-RF-Plug. In accordance with Fig. 12a this initialisation Ini may take place through a contact-less initialisation identification medium Ini-RF-IM, from which the initialisation information Ini-I is registered in the reading station C-RF-WR. With general initialisation information Ini-I, which are not
20 defined within the scope of an authorisation system A, the read/write station becomes an initialised read/write station C-RF-WR(Ini). With initialisations, which are defined and administered within the scope of a hierarchic authorisation system A, the read/write station through corresponding initialisation information Ini-A-I becomes an initialised read/write station C-RF-WR(Ini-A).

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In accordance with Fig. 12b, the initialisation takes place through an initialisation contact medium Ini-C-IM.

According to Fig. 12c, the initialisation of the read/write station C-RF-WR may also take place through a network N, through which the initialisation information Ini-I, resp., Ini-A-I are transferred into the read/write stations C-RF-WR.

- 5 Fig. 13 illustrates the initialisation of contact-less identification media RF-IM as well as of the reading stations, i.e., of converter modules C-RF, resp., plug-in modules C-RF-Plug and read/write stations C-RF-WR. These initialisations Ini may represent general system initialisations or may take place within the scope of a hierarchic authorisation system A (refer to Fig. 12a-c) and furthermore also within the scope of
- 10 sub-authorisation systems UA.

In this example, two sub-authorisation systems UA1 and UA2 within the scope of the authorisation system A are depicted.

Fig. 13 in a sequence from top to bottom illustrates:

- 15 – A general initialisation Ini (which does not take place within the scope of the authorisation system A) of a plug-in module C-RF-Plug(Ini) for the communication with contact-less identification media RF-IM(Ini). A general initialisation of this kind may, e.g., take place through unique production numbers of the identification media RF-IM and of the reading stations C-RF-WR
- 20 and C-RF-Plug.
- An initialisation Ini-UA1 of a plug-in module C-RF-Plug(Ini-UA1), resp., of the converter module C-RF(Ini-UA1) within the scope of the authorisation system A and of the sub-authorisation system UA1 for the communication with identification media RF-IM(Ini-UA1) and also with identification media RF-
- 25 IM(UA1), which already prior to the extension of the contact system C are utilised within a contact-less system RF within the scope of the sub-authorisation system UA1 and which therefore are already implicitly initialised.
- An additional initialisation Ini-UA2 within the scope of a second sub-authorisation system UA2, wherein here a plug-in module C-RF-Plug(Ini-UA1,

UA2) and a read/write station C-RF-WR(Ini-UA1, UA2) are initialised within the scope of both sub-authorisation systems UA1 and UA2. The example in this context illustrates an identification medium RF-IM(Ini-UA1, UA2), which is initialised within the scope of UA1 and UA2 as well as an identification medium RF-IM(Ini-UA2), which is only initialised within the scope of the sub-authorisation system UA2.

- And at the bottom a pure contact-less read/write station RF-WR(UA1) and a corresponding identification medium RF-IM(UA1), which communicate within the contact-less system RF, not, however, with the contact system C.

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Application example:

Two independent users want to equip an existing contact system with additional contact-less identification media RF-IM, corresponding applications and with plug-in modules C-RF-Plug. Assigned to each of these independent user respectively is a sub-authorisation system UA1, UA2, in which they are able to design their respective independent applications App1 in UA1 and App2 in UA2.

They have introduced two new customer bonus applications App1 in UA1 and App2 in UA2. In addition it shall be determined, that the discount in the case of the application App 2 is greater, if a customer also participates in the application App1, not, however, vice-versa. Customers, who only participate in the App1, therefore do not need cards with App2, i.e., identification media RF-IM(App1/UA1) are sufficient. Correspondingly all those businesses may be equipped with plug-in modules C-RF-Plug(UA1, UA2), which within the scope of both sub-authorisation systems are initialised or businesses may also be equipped with plug-in modules in accordance with requirements, which are only authorised within the scope of one sub-authorisation system UA. The initialisation within the scope of only one sub-authorisation system forms an additional security measure for maintaining the independence of the applications. This would also make it possible to provide all

customers with identification media RF-IM(App1/UA1, App2/UA2), which are initialised within the scope of both sub-authorisation systems, because it is cheaper to re-equip the reading stations C-RF-Plug than a large number of identification media RF-IM.

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With the schematically depicted installation according to Fig. 14, the universal applicability of the method in accordance with the invention and with the converter modules C-RF in the contact-less read/write stations is further illustrated. This installation comprises host computers H, with applications App, with read/write - /
10 reading stations WR as well as with identification media IM. Fig. 14 illustrates (represented from top to bottom) the possible step-by-step introduction of initialised contact-less identification media RF-IM with assigned initialised contact-less read/write stations C-RF-WR, resp., C-RF-Plug and the expansion, resp., the extension of applications up to a possible partial or complete transformation of the
15 original contact card system with contact communication K-C into a contact-less system with contact-less identification media RF-IM and contact-less communication K-RF, I-RF. This installation in possible extension stages illustrates from top to bottom host computer H with contact applications C-App, a contact interface S with contact communication K-C, I-C, complemented by contact applications C-App in
20 application computers App-uP of the read/write stations WR. These can be complemented by host computers with contact-less applications RF-App and with a contact-less interface S(RF) with contact-less communication K-RF, I-RF.

With respect to the assigned read/write stations WR one first departs from a pure
25 contact card system with contact card read/write stations C-WR (e.g., in accordance with Fig. 1a, 1b). This is complemented
- with initialised plug-in modules C-RF-Plug capable of being plugged into the existing contact card reading stations (e.g., according to Fig. 2a, 2b)

- as well as with initialised contact-less read/write stations C-RF-WR (in accordance with Fig. 3a, 3b),
- with combined stations C-RF-WR and RF-WR (according to Figs. 4b, 5b)
- and finally with pure contact-less read/write stations RF-WR (without the necessary
5 converter module C-RF).

With regard to the identification media, possible expansion stages 31 – 35 are illustrated:

The existing installation only comprises contact identification media C-IM.

- 10 With the stage 31, in accordance with the invention additional initialised contact-less identification media RF-IM with a contact application in RF - language RF(C-App) are introduced.

In stage 32, RF-IM media are introduced, which contain several contact applications RF(C-App1), RF(C-App2).

- 15 In stage 33, RF-IM media are introduced, which contain more than one type of contact application with different kinds of contact communication K-C1, K-C2, (e.g., of different independent operators): RF(C1-App), RF(C2-App).

In stage 34, RF-IM media are introduced, which in addition to the contact applications RF(C-App) also contain pure contact-less applications RF-App.

- 20 Finally in stage 35 contact-less identification media RF-IM are introduced, which only contain contact-less applications RF-App.

- These described expansion stages 31 – 35 in principle are capable of being implemented on any contact-less identification medium RF-IM, in that new
25 applications are introduced and old applications are deleted, i.e., the contact-less identification media do not have to be replaced.

In parallel to this expansion with respect to the contact-less identification media RF-IM and the applications contained therein (this also with regard to the number of

media utilised) of course also the assigned read/write stations may be expanded and if so required also replaced step-by-step.

This results in a step-by-step transformation of a system with contact card
5 applications into a contact-less system – without it being necessary to re-write the rules and protocols of a contact card communication in the system on the level of the host to the rules and protocols of a contact-less communication.

The new method in accordance with the invention for the introduction of contact-less
10 identification media RF-IM comprises essential advantages:

- the existing contact system may continue to be utilised,
- only small investment steps are required with correspondingly low costs; - mistakes during the introduction and the risk of failures are substantially reduced,
- the expansion steps, e.g., with plug-in modules C-RF-Plug are capable of being
15 temporarily set up, tested and also replaced and changed again,
- depending on the requirements and needs, almost any expansion – and adaptation steps are possible, this also with respect to the applications.

An important advantage above all is also the fact, that the contact-less identification media RF-IM may contain several, in particular also several independent
20 applications, wherein this also includes several types of contact communication and contact-less communication (K-C1, K-C2 and K-RF1, K-RF2). For a user it is important, that with an identification medium of this kind he is able to cover several applications for his required fields of application and this in principle in any combination.

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Applications of this kind, which are carried out at corresponding contact-less read/write stations C-RF-WR with appropriate dialogue devices 11, for example, are local and temporal access control, access to devices of the information – and communications technology (computers, videophones / picture-phones) and to IT -

applications (data bases, networks, encryption techniques) as well as credit – and check – or value card applications.

Examples for the practical application of contact-less identification media may be:

- 5 local access to secure rooms and to computer work places (Personal IT Access), access to networks and secure data bases, access to cash registers in shopping centres for the cashier, the obtaining of services and goods, e.g., at service stations and automatic food vending machines, multiple entrance cards for sports – and leisure facilities, parking buildings and for public transport, etc.

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In preference an appropriate authorisation system suitable for an installation, resp., for a system of installations is defined, which at least records and administers all contact-less identification media RF-IM with all applications (RF(C-App) and RF-App) contained therein. In addition, of course also contact applications of contact media C-IM and read/write stations belonging to these may be recorded and administered.

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For the application special advantages result, if a hierarchic authorisation system A is defined, which ensures the utilisation and description of the contact-less

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identification media RF-IM with independent, mutually non-influenceable applications, wherein the independent proprietors of the applications are capable of at any time autonomously and independently registering and also changing in the contact-less identification media RF-IM.

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An authorisation system A of this type, e.g., is described in the WO97/34265 for a contact-less communication system with contact-less applications. Here a hierarchic authorisation system applicable to all identification media and to all assigned read/write stations is defined, with which every identification medium has to be initialised and with which the mutual non-influenceability of all independent

applications is assured and wherein a proprietor of an independent application authorised by the proprietor of the system at any time is able to autonomously register his application in new identification media and in identification media, which already contain other independent applications. This also independent of the

5 agreement of a central station of the proprietor of the system.

Within the framework of this description, the following designations are employed:

	C-	contact -
10	RF-	contact-less -
	C-IM	contact cards, - identification media, (application media)
	RF-IM	contact-less identification media (application media)
	C-RF	converter module = 1 + 2 + 3
	C-RF-WR	RF - read/write station with converter module
15	C-RF-Plug	converter module as plug-in module in C-WR
	C-WR	contact card reading station, resp., read/write station
	RF-WR	contact-less reading station, resp., read/write station
	H	host computer
	K	communication
20	I	information
	K-C, I-C	contact communication and - information
	K-RF, I-RF	contact-less communication and information
	RF-App	RF - application
	C-App	contact (card) - application
25	RF(C-App)	C – application in RF - language
	App-uP	application computer
	cryp	encryption of the RF - communication
	shad	shadow memory in RF-IM, C-RF-WR
	S	contact card interface

	S(RF)	interface for contact-less communication
	A	authorisation system
	UA	sub-authorisation system
	AE	authorisation element
5	AE-RF	RF - authorisation element
	AE-C	contact authorisation element
	A-RF-IM	RF - authorisation medium
	A-C-IM	contact authorisation medium
	A-C-RF-WR	authorisation read/write station
10	A-I	authorisation information
	A-I-RF, A-I-C	RF - , resp., C - authorisation information
	KW	means for the selection of the type of communication (C, Ci or RF)
	N	network
	Ini, (Ini)	initialisation, initialised
15	Ini-I	initialisation information
	Ini-A-I	Ini-I within the scope of an authorisation system A
	(Ini-A)	initialised within the scope of A
	(Ini-UA1)	initialised within the scope of UA1
	Ini-RF-IM	contact-less initialisation identification medium
20	Ini-C-IM	initialisation contact medium
	1	C – communication part
	2	C/RF – translation part
	3	RF – communication part
	4	RF – transmitter / receiver (set)
25	5	RF - antenna
	6	contacts to C-WR
	7	connections to S
	8	power supply
	9	energy store

	10	power control, - amplification
	11	dialogue device
	12	display
	13	input keyboard
5	14	biometric identification, sensor
	15	PIN - code
	31 – 35	expansion stages with respect to RF-IM

CLAIMS

1. Method for the operation of contact-less identification media RF-IM in a system with a contact application C-App for contact cards C-IM, characterised in that an initialised (Ini) converter module C-RF is connected in series, which
5 on the one hand carries out a contact-less communication K-RF with initialised (Ini) contact-less identification media RF-IM and on the other hand carries out a contact communication K-C at a contact card interface S to a host computer H or to an application computer App-uP of a contact read/write station C-WR for the communication with a contact application C-App of the system and
10 which with respect to communication rules and information I-RF translates the contact-less communication K-RF into a contact communication K-C with contact information I-C and vice versa.
2. Method according to claim 1, characterised in that the converter module C-RF
15 also comprises a means KW for the selection of the type of communication between different types of contact communications K-C1, K-C2 and contact-less communications K-RF1, K-RF2.
3. Method according to claim 2, characterised in that the selection of the
20 communication is automatically implemented in correspondence with the application (C1-App, C2-App, RF1-App, RF2-App).
4. Method according to claim 2, characterised in that the selection of the
25 communication is implemented in correspondence with a request from the side of the host H or of the application computer App-uP.

5. Method according to claim 2, characterised in that the selection of the communication is implemented in correspondence with a request from the side of the identification medium RF-IM.
- 5 6. Method according to claim 1, characterised in that the converter module C-RF is directly connected to the interface S and is implemented as an initialised (Ini) read/write station C-RF-WR.
7. Method according to claim 1, characterised in that the converter module C-RF
10 is implemented as an initialised (Ini) plug-in module C-RF-Plug capable of being plugged into an existing contact read/write station C-WR and as a contact-less reading station.
8. Method according to claim 1, characterised in that the converter module C-RF
15 is driven by a contact application C-App from an assigned host H or an application computer App-uP according to the rules and protocols of a standardised contact communication K-C with standardised contact information I-C, and vice versa, and that the converter module C-RF responds to the contact application C-App according to the same rules and protocols and
20 vice versa.
9. Method according to claim 8, characterised in that the converter module C-RF is driven by and responds in accordance with standardisation protocols according to national or international organisations such as ISO, IEC, IEEE,
25 ANSI, CEN or CENELEC.

10. Method according to claim 1, characterised in that the initialisation (Ini, Ini-A) is defined, administered and executed within the scope of a hierarchic authorisation system A.
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11. Method according to claim 1, characterised in that for writing processes in case of the contact-less communication K-RF from the converter module C-RF to the contact-less identification media RF-IM shadow memories (shad) in the identification media and/or on the converter module are utilised.
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12. Method according to claim 1, characterised in that for the registration of contact applications C-App in contact-less identification media RF-IM an authorisation read/write station A-C-RF-WR with a converter module, with an authorisation element AE as well as with authorisation information A-I are
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- utilised.
13. Method according to claim 12, characterised in that an authorisation element AE, which contains the authorisation information A-I, is built into the authorisation read/write station A-C-RF-WR.
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14. Method according to claim 12, characterised in that the authorisation information A-I is transferred to the authorisation read/write station A-C-RF-WR by means of a mobile contact authorisation medium A-C-IM.
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15. Method according to claim 12, characterised in that the authorisation information A-I are transferred to the authorisation read/write station A-C-RF-WR by means of a mobile contact-less authorisation medium A-RF-IM.

16. Method according to claim 12, characterised in that the authorisation information A-I is transferred to the authorisation read/write station A-C-RF-WR through a network N.
- 5 17. Converter module for the contact-less communication K-RF with initialised (Ini) contact-less identification media RF-IM in a system with a contact card application C-App and with contact communication rules, characterised in that the converter module C-RF is initialised (Ini) and
 - on the one hand comprises a part (1), which carries out a contact
 - 10 communication K-C, I-C at a contact card interface S to a host computer H or to an application computer App-uP of a contact read/write station C-WR
 - on the other hand comprises a part (3), which carries out the contact-less communication K-RF, I-RF to the contact-less identification media RF-IM
 - and comprises a part (2) as translation part C/RF, which translates the contact-
 - 15 less communication K-RF, I-RF into the contact communication K-C, I-C.
18. Converter module according to 17, characterised in that the converter module C-RF also comprises an RF – transmitter / receiver (4) with an antenna (5) for the contact-less communication K-RF with contact-less identification media
- 20 RF-IM.
19. Converter module according to claim 17, characterised in that an energy store (9) is provided.
- 25 20. Converter module according to claim 17, characterised in that means for the autonomous power supply such as batteries or solar cells are provided.
21. Converter module according to claim 17, characterised in that means for the power control and - amplification (10) are provided.

22. Converter module according to claim 17, characterised in that the converter module is assigned a dialogue device (11) for the execution of applications.
- 5 23. Converter module according to claim 17, characterised in that the dialogue device (11) comprises elements such as a display (12), input keyboard (13), biometric identification (14), PIN code (15).
- 10 24. Converter module according to claim 17, characterised in that the converter module is assigned an application computer App-uP for the execution of an application App, independent of a direct on-line connection to a host H.
- 15 25. Converter module according to claim 18, characterised in that the RF – transmitter / receiver (4) comprises an encryption (cryp) and/or a shadow memory (shad).
- 20 26. Converter module accord to claim 17, characterised in that the converter module comprises a contact interface S to contact applications C-App and with this forms a contact-less read/write station C-RF-WR.
- 25 27. Converter module according to claim 26, characterised in that the contact-less read/write station C-RF-WR comprises additional means for the contact-less communication K-RF, I-RF with contact-less applications RF-App at an interface S(RF).
28. Converter module according to claim 17, characterised in that the converter module comprises a contact (6) and is implemented as a plug-in module C-RF-Plug, which is capable of being plugged into an existing contact read/write station C-WR.

29. Converter module according to claim 17, characterised in that the RF – communication part (3, 4) is implemented for the contact-less communication with contact-less identification media RF-IM, which contain several independent applications (App1, App2).
30. Converter module according to claim 17, characterised in that the converter module C-RF is integrated in an application computer App-uP.
31. Installation with a host H, a contact interface S, contact read/write stations C-WR and contact identification media C-IM, characterised in that initialised (Ini) converter modules C-RF are provided for the contact-less communication with additional initialised (Ini) contact-less identification media RF-IM, wherein the converter modules C-RF on the one hand carry out a contact communication K-C, I-C to the interface S of the contact system and on the other hand carry out a contact-less communication K-RF, I-RF to the contact-less identification media RF-IM and which translate the contact-less communication into the contact communication, and vice versa.
32. Installation according to claim 31, contact-less identification media RF-IM with several independent applications (App1, App2) are provided, which communicate with the applications through the converter modules C-RF.
33. Installation according to claim 31, characterised in that, in addition to the contact system with contact applications C-App and contact communication K-C, I-C at an interface S, also a contact-less system with contact-less applications RF-App and contact-less communication K-RF, I-RF at an interface S(RF) is provided with contact-less reading stations RF-WR and with

contact-less identification media RF-IM, which contain several independent applications RF-App.

- 5 34. Installation according to claim 31, characterised in that an authorisation system is defined, which records and administers at least all contact-less identification media RF-IM with all applications contained therein.
- 10 35. Installation according to claim 31, characterised in that a hierarchic authorisation system A is defined, which assures the utilisation and registration of the contact-less identification media RF-IM with independent, mutually non influenceable applications, wherein the independent proprietors of the applications are able at any time to autonomously and independently register and also change their applications in the contact-less identification media RF-IM.
- 15 36. Installation according to claim 31, characterised in that the following applications with corresponding dialogue devices (11) are provided: local and temporal access control, access to devices of the information – and communications technology (computers, videophones / picture-phones) and to IT - applications (data bases, networks, encryption techniques), credit and
- 20 cheque – or value card applications.

ABSTRACT

For the operation of contact-less identification media RF-IM in a system with contact applications C-App for contact cards C-IM, an initialised converter module C-RF is connected in series as a read/write station. This converter module on the one hand
5 executes a contact-less communication K-RF with initialised contact-less identification media RF-IM and on the other hand a contact communication K-C at a contact card interface S to a host computer H or to an application computer App-uP for the communication with a contact application C-App of the system and the converter module translates the contact-less communication K-RF with respect to
10 communication rules and information I-RF into a contact communication K-C with contact information I-C and vice versa. This makes possible a particularly simple and efficient introduction of contact-less identification media RF-IM into existing contact card systems and - installations.

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(Fig. 2a)